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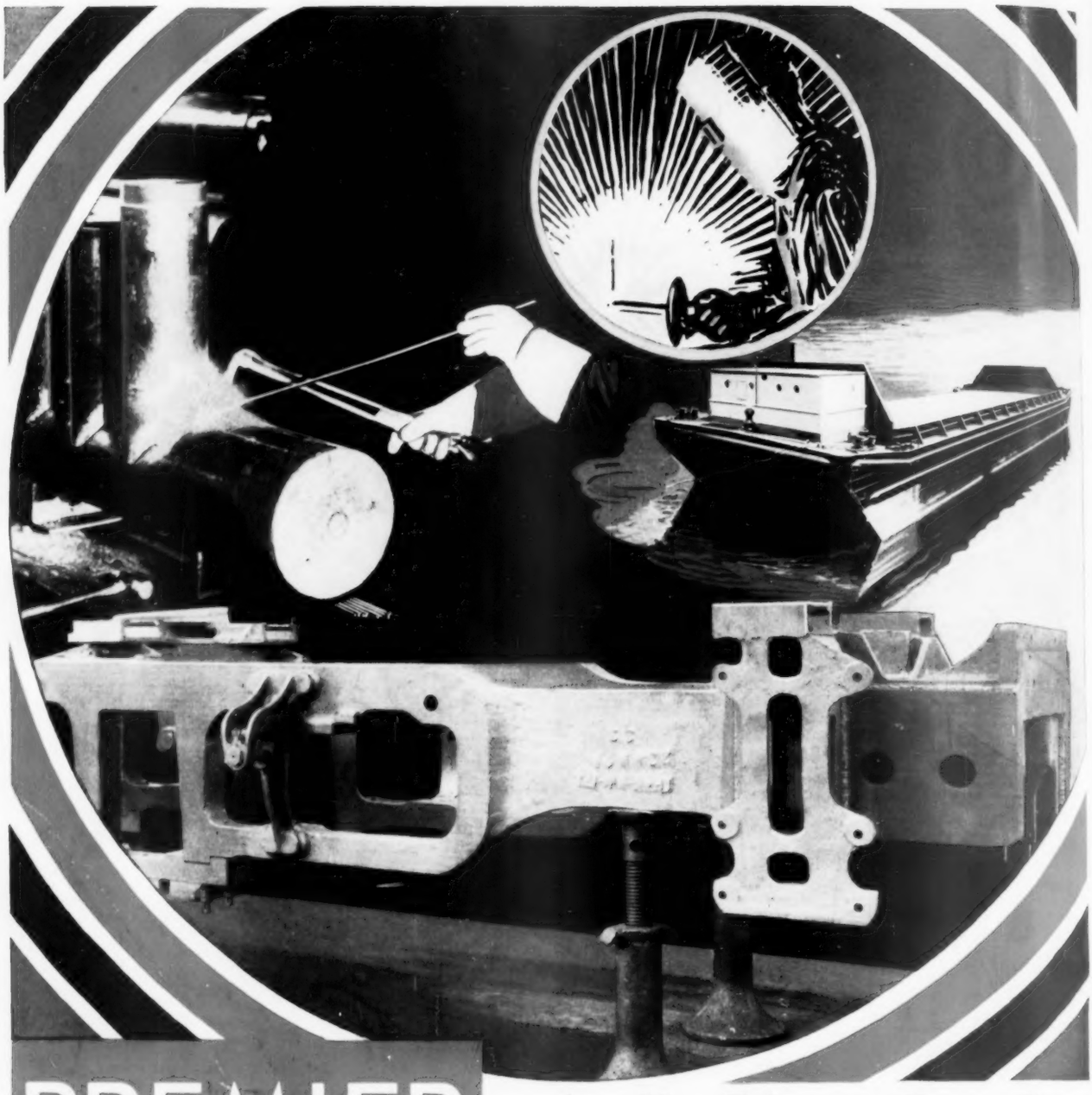
Destructive Test of Welded Model Wye (See Page 25)

November
1932



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The Welding Engineer does not publish in its news or advertising columns any matter that deals with or refers to either personal or legal controversies.

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EDITORIAL

Reflections on the Election

THE American people have decreed, through the ballot box, that the Democratic party shall control the country beginning next March. It's a big task to hand anybody, and congratulations extended the President-Elect should carry with them a deep, abiding sympathy, for in his own camp there are those of his followers who will demand that he perform miracles and then will revile him when he does not, and in the other camp there are those too intent on seeking retaliation by slashing wages, canceling contracts, and harboring grudges in such times as these when sympathy and cooperation should hold sway.

* * *

EVERY individual and every firm in our country should continue to give unstintingly of their loyalty and constructive support to the incoming administration. Any one who does otherwise deserves to be branded as a slacker just as surely as he would be in time of war. This is a time for plain speaking and plain acting. Those who want to gum up the works can't stop the machinery, but they can slow down the machine and cause further hardship, suffering, and distress to a people already steeped in misery caused by industrial stagnation. Are they willing to pay such a price for revenge? If they are, their names and their acts should be made public, and let those who suffer read.

* * *

WHAT business does during the next four years will not rest so much with the powers in Washington as with business men themselves. Tariffs, taxes, prohibition, foreign policies, all have an affect on business, of course. But these are only expedients used in trying to solve man-made problems.

* * *

ONE of these problems which man has created involves the directing of trade between countries. When every country acts like a policeman who directs traffic in only one direction and bars all wanting to go the other way, there will be no traffic. We have almost reached that point today. The world has gone tariff mad. Even those who have clamored for high tariffs admit it. It has taken such times as these to demonstrate that the direction in which trade moves is not as important as the need that it move somewhere. Business can help solve this problem by taking a more liberal attitude on the matter of restrictions to trade.

* * *

A FAR more significant thing about the election than its outcome is the big number who showed enough interest in government to take advantage of their suffrage rights. For the first time in many, many years, long queue lines formed at the voting places and people waited in line to get an opportunity to cast their ballots. To those who are accustomed to entering a voting booth without waiting, the outpouring on November 8th was a novel experience. If the citizenry will continue to interest themselves in government to the extent they did during the election just passed, we as a nation will come out of our present crisis and become mightier than ever; and then, sad to relate, we will slump again into lethargy, lose interest in everything but bank balances and pleasures, and then find ourselves again confronted with feeding multitudes of hungry citizens who can't find work, for history repeats itself with appalling consistency.

* * *

MANY listening in on election returns the night of November 8th were struck by the fact that reports were coming in from New York state much more frequently, as well as earlier, than those from the other states along the Atlantic seaboard. The reason is said to be that voting machines are common in that state. Thus the votes cast in an election are quickly tabulated. In only a few hours after closing of the polls, enough precincts had reported in that state so that it was definitely known which group of electors had been chosen.

* * *

A HUNDRED MILLION ears were tuned in on the election returns. The possessors of those hundred million ears are almost all buyers. They are buying the bare necessities of life if nothing else. But many of them are now thinking about buying that new suit, that automobile, that platinum ring, or that suite of furniture that they have been putting off for so long because of reduced income and falling prices. Some of them are now buying these things. More will follow. In some industries, machinery that has been idle for many months is now oiled up and producing commodities for market.

* * *

BUT the general public and industrial firms have not yet started buying in earnest. However, when they do start, there will be no rocket signal three months ahead. And the manufacturer, the railroad, the laundry plant, and the repair shop who are equipped and ready to serve the buyer at a drop of the hat are going to get his business, while the others who have to dally around trying to get their equipment into shape to meet production requirements will have to pay higher prices for repairs and replacements and be unable to offer quick delivery.

* * *

DESPITE all that the humanizing agencies have been able to do with it, business still remains to a large extent a coldblooded proposition. A buyer of bolts and nuts accepts no excuses for failure to meet his specifications; and if the promised date of delivery does not suit him, he sends his order elsewhere. He can do it in these times because he is almost sure to find somebody who can meet his requirements and at the right figure.

* * *

NO PLANT today can afford to keep run-down equipment. It is all the more inexcusible when the cost for repairs and new parts is but a fraction of what it was three years ago. The plant that is oiled up and well maintained is going to be among the first to report to the hundred million "listeners-in" when business votes "full speed ahead."

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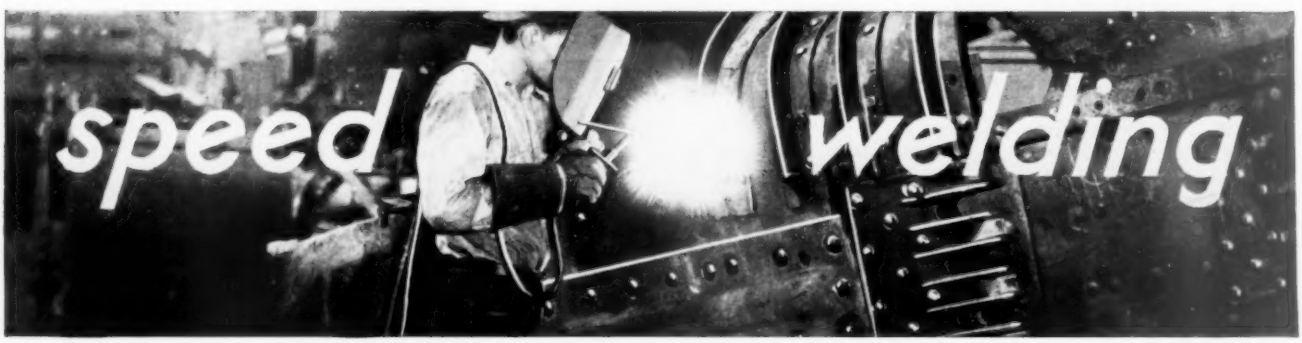
makes Wilson Machines pre-eminent in



Only by maintaining *constant current* at fixed settings over the entire range of the machine can metal be deposited with utmost *speed.* And constant current cannot be maintained without *close current control.* Because of their *close control,* Wilson Machines maintain constant current with practically no variation—they enable you to deposit more pounds of metal per KW hour input. Use Wilson Machines for both speed welding and strength welding. Consult Wilson Welder & Metals Company Inc., North Bergen, N. J.

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THE MONTHLY SYMPOSIUM

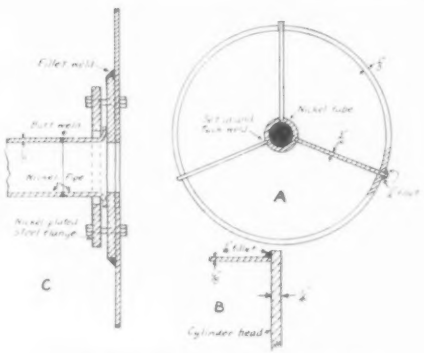
Production and Fabrication

Nickel

The dry-cleaning unit shown in the illustrations was built almost entirely of nickel, and shaped, fabricated and welded by the Youngstown Welding & Engineering Company, Youngstown, Ohio. According to A. M. McFarland, welding engineer for this company, this unit contains 5000 lbs. of pure nickel, comprising perforated drums, cylinders, pipes, valves, condensers, and other parts, all built up from flat nickel plate. Some of the flanges and outside parts are of steel, nickel plated, but all parts coming in contact with the cleaning fluid are of pure nickel. The smallest-gage sheets used were less than ⅛ in. in thickness, and the sizes ranged up to more than ¼ in. in thickness. A considerable variety of ingenious forming methods were employed and worked out in making the more intricate parts of this unit.

The larger cylinders and cylindrical parts were rolled and shaped by the usual boiler-shop methods, except that the nickel sheets were covered with special sheets of soft pasteboard while rolling to protect the highly polished surface from being marred. Tubes and connections too small to roll were formed by a power-driven bending "brake" and finished by tin-knocker methods on a mandrel.

The large heads were made from heavy nickel sheets, with steel stiffening strips or rings around the edge. These rings were welded up from steel plate and were drilled to receive the head bolts. The covers, hinges and holding-down mechanism were fabricated from flat stock and welded together.



Design of Joints in Nickel Cylinder.

The inside revolving drums that are to contain the articles to be cleaned were quite complicated parts to make. Each of these drums comprises a heavy nickel cylinder, perforated by thousands of ⅜-in. holes and divided into compartments, as shown in diagram *A*. The central supporting shaft is a heavy nickel tube with a central steel filler shaft, which extends beyond the heads of the cylinder and is connected to the driving mechanism. These cylinders have neat-fitting doors, equipped with hinges and lock, all fabricated from nickel.

The heads were welded to the cylinders with a ¼-in. fillet weld, as shown in diagram *B*. The method of connecting the nickel shaft to one of the end plates is illustrated in diagram *C*.

In cylinder and pipe walls where the load was light, butt welds were used. These were bead welded on the outside of the seam as deep as possible and then ground flush.

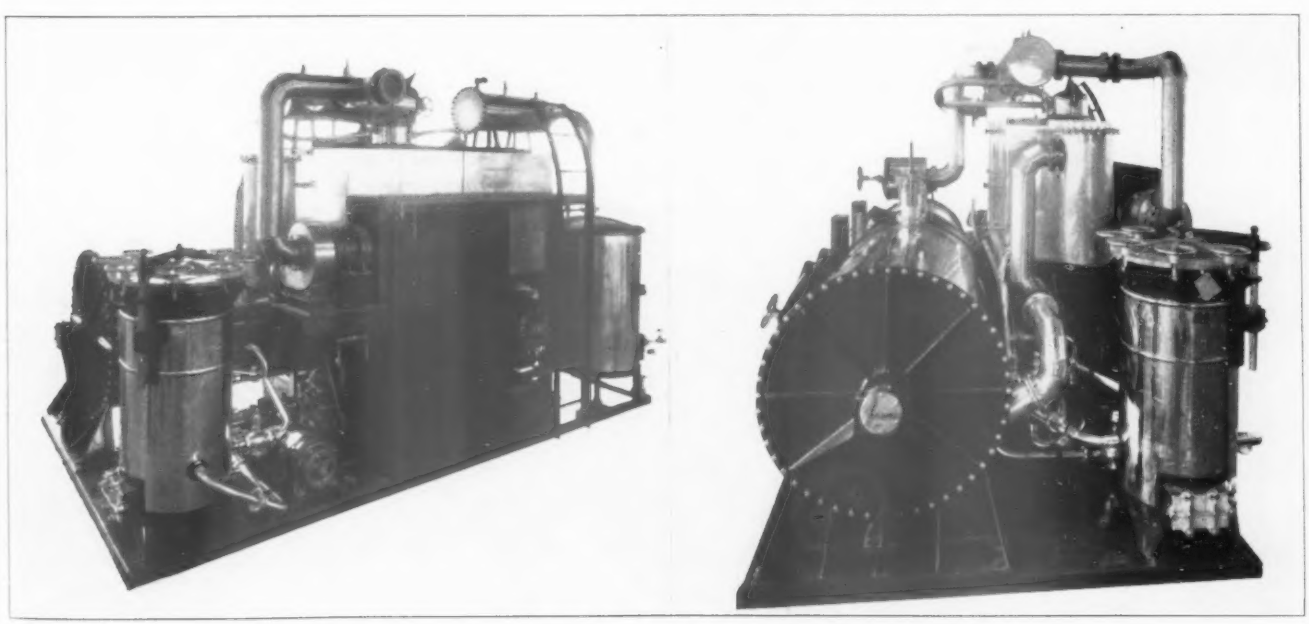
It was a difficult problem to avoid distortion in welding these tanks and cylinders of thin material. Various expedients were employed to keep the surfaces in shape while welding.

Whenever too much current was used, the weld was porous and showed minute leaks. By holding the current down to certain limits, the resulting weld was smooth and sound.

Most of the welding was done with the carbon arc, a heavily coated nickel filler rod being fed into the arc and puddled down. This was found to make a smoother and better job than obtainable with the metallic arc. International Nickel Company coated nickel rods, ⅛ and ⅜ in. sizes, were used. The current varied from 75 to 175 amperes.

The rotating drums are operated at low speed for washing and at high speed for extracting. A pump forces the cleaning fluid through multiple strainer plates, and the vaporized portions pass through an elaborate condenser.

The entire unit is mounted on a



Views of Dry-Cleaning Unit, the Nickel Parts of Which Are Welded.

welded steel base and stands 10 ft. high. Provision was made for dismantling for shipment by designing the separate units with individual bases and supports.

Shop Equipment

The illustration shows that a great variety of shop equipment can be cut and weld-assembled with an oxyacetylene torch. These pieces of equipment were fabricated from odd pieces and from scrap by Ivo V. Pennington in his shop in Wauneta, Nebr. The seven pieces shown are:

No. 1. Two waste-rag cans with hinged lids, made from grease drums.

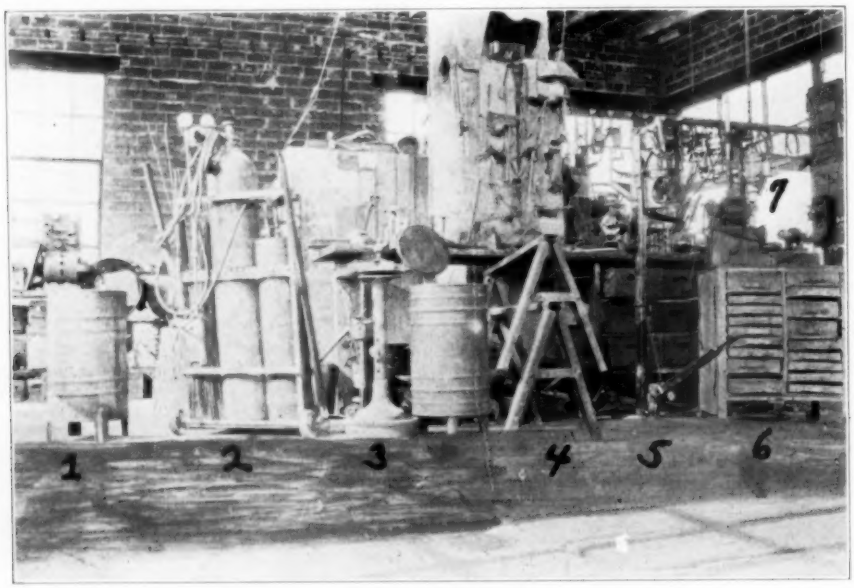
No. 2. Welded truck made from angle iron and tubing from the junk pile. The castors came from a discarded platform scale.

No. 3. Tire-changing stand for cars equipped with wire wheels. This stand is made from an automobile flywheel, axle housing, threaded 1-in. rod and nut, and some scraps of frame. The steel horses shown were made from car frames, and were bolted because at that time the shop didn't have a torch, but welded horses would be more rigid.

No. 5. Brake riveter and countersink. The head was a hand-operated riveter, and the pedestal was made from a flywheel, car driveshaft tube, steel pipe, and scraps of frame. The countersink assembly parts were one time a generator and distributor drive and a chuck from an old electric drill.

No. 6. Tool cabinet, made from angle iron and old body steel. The castors are double-row ball bearings.

No. 7. Electric-drill stand.



Parts Produced From Scrap Metal by Welding.

Maintenance Welding

Log Handling and Sawing

By Jos. C. Coyle

The Veneer Package Company, of Denver, is engaged in converting elm, maple and cottonwood logs, cut from the borders of roads and streets in and around Denver, into packing boxes, crates, hampers and baskets. Lumber is cut from the smaller logs with a small saw rig adapted to the work, while the larger logs are chucked in a Coe lathe and made into veneer. Anyone familiar with the tough, knotty nature of the cottonwoods commonly found on streets and parkings will realize the great strain put upon machinery in cutting and sawing this kind of timber. Wear and tear is great, and breakage of important parts is not infrequent.

A small Linde acetylene welding unit, with Imperial torch and tips, has gone far toward solving the maintenance problem for the firm, the maintenance man having become proficient in its use. Larger parts of the machines which are easily removed when broken are preheated in a forge before welding. Oxweld bronze rod and Brazo flux are used on the larger parts, such as the 10-in. gears from the conveyor to a drag saw which cuts the logs to length, and a sliding collar which takes the pressure when logs are chucked in the lathe—parts which have been successfully repaired by brazing.

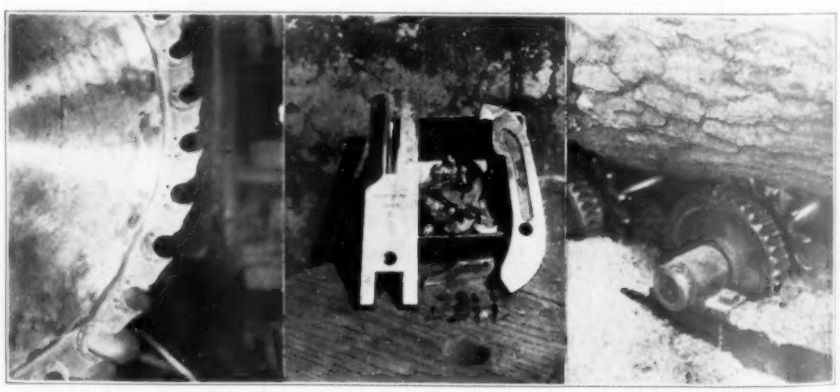
In the case of the conveyor, the original cast-steel teeth wore off, and were successfully replaced with bronze overlay, then ground between the teeth. A cog wheel on the planer broke in three sections. These were preheated and brazed with less than half a day's delay, whereas sending out the part, or securing a replacement, would have involved probably two days' loss of time. No. 6 and No. 8 tips were used in brazing these parts.

The loop bar and former parts on the Saranac stitchers, used in attaching cleats and veneer to crates, are also subject to fast wear. The worn portions are easily built up with rod of composition similar to the part and made as serviceable as new.

One of the most profitable uses of the torch, however, is in building up the insert teeth of the big circle saw which rips the knotty cottonwood into lumber. These teeth cost, originally, $5.95 per hundred, and ordinarily last only about three filings (which are quite frequent). The cutting end of the teeth are built up to about two or three times original size, using a No. 2 tip. The teeth are then ground down and placed on the saw and finished with a file. This operation greatly lengthens the life of these teeth.

Copper Stills

A large business in the welding of leaky copper stills has been built up by Flynt's Auto & Machine Company, Pel-



(Left) Saw With Insert Teeth. (Center) Box of Built-Up Saw Teeth With Four Finished Teeth in Foreground, and Parts of Stitcher Repaired by Welding. (Right) Gear of Log Conveyor With Brazed Teeth.

ham, Ga. This is not a new post-Volstead industry, since these vessels are used exclusively for distilling turpentine, according to R. G. Wilson, of the Atlanta office of the Burdett Oxygen Company, who supplies the information that Mr. Flynt's fame as a copper welder has spread far and wide, and in one week he and his assistants repaired ten such stills.

The one illustrated is known as a 35-barrel size, and is in use near Bainbridge, Ga., on the Flint River, about 150 miles from Mr. Flynt's shop.

These stills are of riveted construction, the rivets also being of copper. Circumferential cracks frequently appear, and then welding is resorted to, following which the still is tested hydrostatistically to make sure that the seams are tight. Out of the hundreds of stills he has brazed, Mr. Flynt has had virtually no failures of the brazed parts revealed by these pressure tests that can be attributed to porosity of either the weld metal or adjacent parent metal. He has used successfully Genuine Tobin bronze, Everdur, and Cigo smokeless bronze.

Copper Still Repaired by Welding.

To make good welds in copper, the heat-absorbing properties of the metal must be provided for, and therefore ordinary welding tactics cannot be followed. On these jobs a No. 8 welding tip is used and the large flame is played continually on the copper sheet being welded. Occasional switching of the flame to the filler rod keeps the rod melting so it will fuse securely to the copper shell of the still.

Structural Welding

Steel Head Frame

By G. N. Robinson*

Why not electric weld the structure? That was the question, after designing engineers had completed the design of a steel head frame employing the conventional riveted steel fabrication method. Electric arc welding had been applied advantageously on smaller jobs, and in this instance, compelled attention and was adopted.

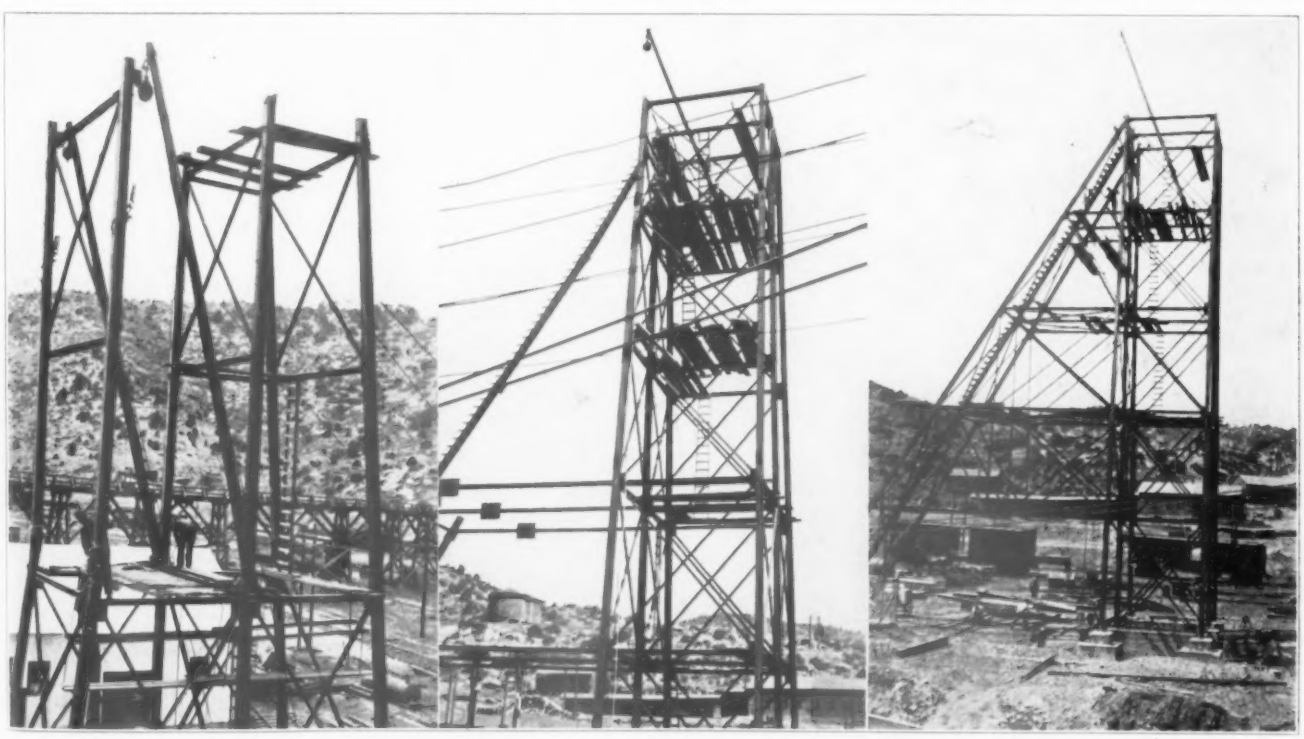
In the extensive coal-bearing district of southern Colorado is located the Delagua coal mine of The Victor-American Fuel Company, one of several properties operated by that company. The sinking of a new shaft was decided as necessary to the economic further development of the property, which, in turn, necessitated consideration of a new head frame—preferably a steel structure.

Engineers of The Victor-American Fuel Company proceeded with the design of the steel structure, to be 90 ft. high, and employing the conventional riveted method of fabrication. Drawings and blue prints of the entire structure, including details and specifications, were completed when it was suggested that fabrication by means of electric arc welding be considered. The Victor-American Fuel Company was ready to order the steel, in accordance with the drawings and specifications, when the General Electric Company was invited to examine the drawings to determine the feasibility of fabricating the structure by means of electric arc welding, without materially affecting the design and specifications as originally prepared for riveting. The General Electric engineers made a few suggested modifications, which were accepted.

The steel ordered amounted to 42 tons and included a quantity of 5-in. and 8-in. H-columns (36-ft. mill lengths), also some 18-in. I-beams and miscellaneous smaller members.

As indicated in the photographs, the structure consists of six tower legs and three braces. The two lower courses (each 36 ft. high) were laid out on the ground and arc welded to form panels, which were hoisted into position and fabricated by means of arc welding. The fabrication of the top course from the 72-ft. level to the top, which is 90

*General Electric Company, Denver, Colo.



Views of Welded Head Frame During Process of Erection.

ft. above the foundation, was accomplished by welding the individual pieces of steel in place.

The structure is designed to support a maximum load of 157 tons, and the double-compartment shaft depth will be ultimately 900 ft. The aggregate weight of the ascending loaded trip and the descending empty trip will be 15 tons, and the rope speed 1580 ft. per minute.

Welding was performed with General Electric single-operator units and Type F ⅛-in. electrodes. The designer figured on a total of 8000 in. of ⅜-in. fillet, but the construction engineers, to be ultra-conservative, increased this to approximately 14000 in., with a total consumption of approximately 850 lb. of electrodes.

The complete job of design and erection was performed by regular employees of The Victor-American Fuel Company; and to insure welds of unquestioned quality, the welding operators were instructed to produce a quantity of test weld pieces which were required to meet certain specifications, before starting construction on the head frame. Wherever a fillet was to be applied, the steel was prepared with wire scratch brushes before welding.

The cost of the completed job was 17% less than the estimated cost for the structure fabricated by means of rivets.

Up to the present time, the structure has served admirably for the sinking of the shaft by handling 6½-ton loads of rock and earth, utilizing a clam-shell bucket.

Welded Bearing Bosses*

By V. A. Prince

The practice of welding a bearing boss direct to a supporting plate is a growing one owing to the saving shown in cost over the employment of the usual spigoted casting bolted in position. The two types are shown in Fig. 1 and the saving is obvious, the welded boss being a piece of steel bar sawn off, welded in position and then bored. The

*From "The Welder" (London).

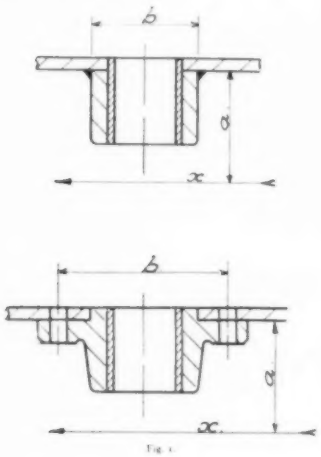


Fig. 1

bush is carried through the supporting plate.

It is not wise, however, to dismiss the bearing as simply as that, particularly where heavy loads are encountered. In the case of the cast iron bearing the bolt flange undoubtedly stiffens up the plate and in addition the applied load on the plate is less, causing less tendency to buckle. A rough estimate of

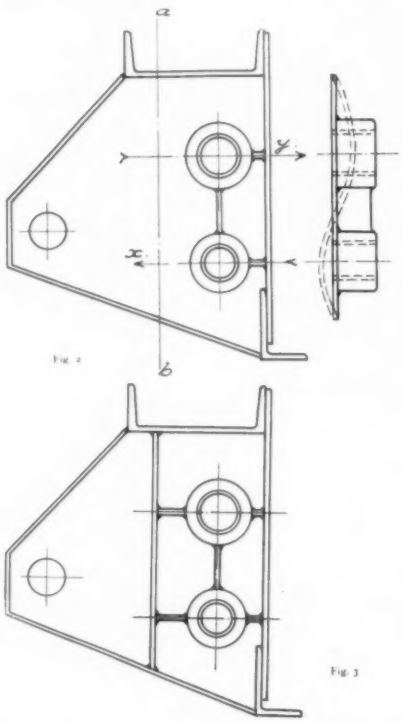


Fig. 2

Fig. 3

the comparative loads on the plate will be apparent from Fig. 1 in which a load x is applied at an arm a. This bending movement divided by the base dimension b will give some idea of the load on the plate and it will be seen at once that the cast iron bearing has an advantageous b dimension. In passing it may be mentioned that, to obtain the fillet stress for the welded boss, the weld may be considered as an annular section of thickness equal to the throat dimension and its modulus used in the usual manner.

With heavy journal loads the concentration of load in the plate due to the welded boss must be taken care of to avoid undue plate buckling and consequent binding of shafts in the journals. To illustrate the need for an analysis of the plate behavior an actual example will be discussed. Fig. 2 shows the side frame of a piece of hoisting machinery with two welded bosses for an intermediate gear which was overhung. There was a tooth load of some 3 tons, which, combined with the comparatively long overhang of the gear from the frame plate, caused the plate to bend along the line *ab* somewhat in the manner shown dotted in the side view. This bending was, of course, much too slight to be discerned by the naked eye, but nevertheless was sufficient to increase the motor current some 25 per cent due to binding of the shafts. After the plate flexure theory was advanced as the cause of the trouble the logical cure was to weld stiffening webs across the line of flexure. This was done as shown in Fig. 3 and a complete cessation of the trouble resulted. The buckle is resisted by the vertical web, the secondary webs from the bosses serving to transmit the load.

Tunnel Liner Plates

As construction progresses at record speed on the 21-mile-long New York City tunnel No. 2, engineers are watching with interest the various methods employed. Arc welding of the steel liner plates to insure watertightness was one of the time-saving devices utilized.

This $43,000,000 tunnel extends from the Hillview Reservoir in Yonkers to Brooklyn, and is part of the Board of Water Supply's system for delivering water to the Boroughs of Bronx, Queens and Brooklyn. Specifications called for special steel liner construction with arc-welded calked joints near and under the East River, where seepage might be encountered.

The steel liner is made up of 1-inch plate fabricated in sections above the ground. Three sections form a 20-ft. circle. A total of 13,920 ft. of ⅜-in. fillet welds were laid above ground along 4x4x½-in. angles which were riveted to the liner segments.

The illustration shows welding operators at work laying the calking welds after the sections had been assembled in the tunnel. Each ring required 102 ft. of continuous welding where two

Arc Welding Liner Plates.

angles butt together. Operators averaged 31 lineal feet of welding per man per hour using the shielded arc method of welding and equipment manufactured by The Lincoln Electric Company. Patrick McGovern, Inc., has the contract for all work on the tunnel.

Annual Convention *of* International Acetylene Association

Holds Forth in Philadelphia

Penn Athletic Club, 18th St. and Rittenhouse Square, Philadelphia, Pa., where the International Acetylene Association is in annual convention.

THE 33rd annual convention of the International Acetylene Association is being held in the Penn Athletic Club, Philadelphia, Pa., November 16th to 18th, with a highly instructive and interesting technical program, the main feature of which is "The Prosperity Process," described as an industrial drama in three acts, by John P. Waters, being presented the evening of November 16th.

In connection with the program, it has been announced that the Morehead Medal for the year 1931 is to be awarded to Gustaf Dalen, of Stockholm, Sweden, inventor and recipient of the internationally known Nobel prize in science.

The keynote address at the opening session is to be delivered by Samuel Vauclain, well-known locomotive builder. J. Hampton Moore, mayor of Philadelphia, will officially welcome the members and guests, and W. C. Keeley, Jr., of the National Carbide Corporation, will deliver the annual President's address. James H. Critchett, of the Union Carbide & Carbon Research Laboratories, Inc., will deliver an address on "Recent Advances and Future Expectations of the Oxyacetylene Process," following which a paper on "Sales Advantages of Welded Products," by J. J. Feichter, of the Heintz Manufacturing Company, will close the session.

Rehabilitation and maintenance will be the subject of papers by John M. Carmody, editor of *Factory and Industrial Management*, and by a plant representative of the Bethlehem Steel Corporation, on Wednesday evening, November 16th. These papers will be followed by the drama, "The Prosperity Process," featuring the importance of oxyacetylene welding for production, equipment maintenance, and rehabilitation for 1933 profits.

"Welded Piping" is the theme of the Thursday morning session, at which Dr. S. Lewis Land, of the Heating and Piping Contractors' National Association, will give a paper on "The Training of Journeymen Welders." Other papers to be read are "Welded Piping in a Central Heating and Power Plant," by R. D. Williams, of Baker, Smith & Co., and "Economies of Welded Piping in Homes," by Fred Maeurer, of the Air Reduction Sales Company. The session will close with the presentation of the Oxyacetylene Committee report by its chairman, H. H. Moss, and a discussion of the report.

The "Transportation" session on Thursday afternoon will include papers on aircraft construction by Capt. Alford J. Williams, Jr., and Lt. E. W. Clexton. W. Constance, of the Chesapeake & Ohio Railroad Co., will discuss "Building Up and Heat Treating Rail Ends," and "Maintenance of Railroad Equipment" will be treated by L. H. Scheifele, of the Reading Company. A paper on "Maintenance of Bus and Motor Truck Equipment," by James W. Cottrell, technical editor of *Commercial Car Journal*, will follow.

The Friday morning session will be given over to the uses of the oxyacetylene process in the steel industry. A paper by E. L. Quinn, of the Jones & Laughlin Steel Company, will be devoted to maintenance, and W. A. Wissler, of the Haynes Stellite Company, will describe

uses of hard facing. Oxyacetylene cutting will be the subject of papers by Everett Chapman, of Lukenweld, Inc., and R. F. Helmkamp, of the Air Reduction Sales Company.

On Friday afternoon, the welding of aluminum will be the subject of a paper by D. E. Roberts, of The Linde Air Products Company. This will be followed by papers on "X-Ray Testing," by Dr. Ancel St. John, of the St. John X-Ray Corporation, and "Gamma Ray Testing," by Dr. Gilbert E. Doan, of Lehigh University. "Chrome-Nickel Steel Riser Cutting," by R. B. Aitchison, of the Oxweld Acetylene Company, will conclude the papers program.

Reports of officers and committees not already given are reserved for the Friday afternoon session. The annual dinner is being held on Friday evening, November 18th.

As It's Done in China

If you, on your first visit to Shanghai, were told to arc weld a structure, how would you go about it? William A. F. Millinger, of the Asiatic Petroleum Company, gives a graphic description of his experiences as an arc welder in the Orient and of some of the quaint customs and habits of the natives as a welder observes them, in a paper submitted in the Second Lincoln Arc Welding Prize Competition, sponsored by the Lincoln Electric Company, and he describes some of the difficulties in getting competent welders and materials. Some of his observations will be of interest to welders in this country and to exporters as well.

Most electric arc welders in the Orient were formerly oxy-acetylene welders and some were blacksmiths, writes Mr. Millinger. After issuing a call for arc welders for erection of a structure in Shanghai, he was greeted by three Chinese lads—welders!—good, fair, and bad, but they were his and he had to do something with them. "I suggested that tomorrow maybe some more would come," writes Mr. Millinger, "but after volumes of language and much gesticulating, I was assured that there weren't any more. Six months later, I agree they are like hen's teeth." This number was augmented by one more, who in his spare time had been given instruction by Mr. Millinger.

The "show me" method had to be resorted to to qualify these men. The procedure was to take the electrode holder and an electrode and demonstrate how it should be done. Should the wrong way be demonstrated, it would always be done that way by the welder and could be corrected only by employing another welder who could be taught anew.

The next problem was to locate 300 feet of welding cables which would handle the current. The only electrode holders available caused some difficulty because of heating of the handles, and the welders began to complain of blisters on their hands. To continue:

"Shields next occupied the attention. It's surprising how a few ounces of extra weight will fatigue a welder. What we had was a wooden contraption with a handle and made of three-ply wood, which warped loose from the glue during the hot humid summer. However, a cable to the U. S. brought out some nice light helmets pronto. The only change in them was to add a neck shield, as in the Orient it is very dangerous to leave the back of the neck uncovered (you can even get sunstroke through the eyes). This leads to the question of proper lenses. The first shields had a red glass, which apparently bothered the welders because I found they were packing colored glass back of it. Again we were advised there were no supplies locally of those comfortable amber-green glasses we use at home, but thanks to the advertisements in THE WELDING ENGINEER I got some interesting data on glasses and we now have a supply on hand from the advertiser and eye troubles are at an end.

"Things which at home were mere incidents, out here assume magnitude. They are vital to the art and science, yet apparently considered of little consequence. Take clothes for instance. The weather being so hot and humid, the welders wore only coveralls. Violet and other rays meant nothing to them. I marveled that they could stand these rays day in and day out, but one day I saw the bare leg of one of the welders and it was burned raw in places, and later another got sick and complained of burning up. I spent a couple of hours myself one day with the rods and neglected to cover my shins. I have lots of respect for that flashing arc, for I got a most beautiful sunburn and water blisters due to my negligence. Proper clothing should be worn by the welders, but out here cuts and sores are of little consequence. A piece of newspaper, preferably colored red, makes an excellent bandage. Tire tape makes a good plaster. If a coolie gets hurt, his friends look upon it as a great joke, and the way they cure an inside pain is to make an outside one greater so that you forget the one inside."

As regards the electrode situation, the bare rod is but little used in the Orient, as the few welding concerns

Chinese Coolies Welding Wiggins Floating Roof.

located there are sold on the advantages of the flux-covered electrode, and even the light-coated rod is not in favor. While welders can manipulate a bare rod, they will probably refuse to have anything to do with it. A shipment of several thousand feet of rod was ruined because the containers were not sealed to exclude dampness. Welding rods should be packed in moisture-tight containers.

"There is plenty of opportunity in the Orient for the propagation of welding," concludes Mr. Millinger. "Its present sphere is in the shipyards, although the power companies do some alternating current work. There is probably no place here for the European or American welder. Sixty cents to $1.50 a day in U. S. dollars is no attraction to a foreigner. Further, the awakening Chinese are ousting the foreign business man so the future business will be in the hands of Chinese. Shipbuilding in Hong-Kong, Shanghai, and even in Hankow has accepted the electric arc welder; but owing to the fact that one can get 50,000 coolies at $4.00 a month each to erect one's buildings, etc., a great saving in capital investment will have to be shown before welding will come greatly to the fore."

Destructive Test of Model Wye

Demonstrates Effectiveness of Welded Construction

A welded model of a wye was hydrostatically tested to a calculated circumferential stress of 82,000 lb. per sq. in., when it failed. Specimens cut from the plate before and after the test showed average ultimate strengths of only 61,000 and 70,650 lb. per sq. in., respectively. Mr. Larson raises the question whether a material will not stand a higher combined circumferential and longtitudinal stress than a uni-directional stress alone.

By D. E. Larson
Chicago Bridge & Iron Works

THE details of almost any structure or structural member can be simplified by replacing riveted construction with welded construction. This is true for pressure vessels and other similar containers. A wye branch of the type used in large pipe lines is extremely difficult to detail and fabricate when riveted construction is used. A large riveted wye in the process of being assembled is shown in Figure 1. The photograph gives some idea of the difficulties involved in fabricating the various parts and fitting them together.

The investigation reported in the following paragraphs was conducted by the Chicago Bridge and Iron Works to discover how the design and fabrication of a two-way wye branch could be improved and simplified by the use of welded construction. Design studies were based on a wye having a main branch 13 ft. in diameter and two smaller branches each 8 ft. 6 in. in diameter. The structural adequacy of the final design was checked by building a model to one-fourth scale and testing it to destruction.

Fig. 1. Riveting Is Expensive and Complicated.

Economic and Constructional Advantages of Welding

The factors receiving the most careful attention in the design of the wye were economy of material and ease of fabrication. The most effective use of material is obtained when it is distributed in such a manner that all parts of the container deflect uniformly under the application of internal pressure. An excess of material at any point should be avoided for the reason that it tends to produce restraint resulting in high localized stresses. Each part of the wye, therefore, was designed to provide the required strength without producing unnecessary restraint. Ease of fabrication was secured by making all surfaces portions either of cylinders or right cones. This reduced to the minimum the difficulty of shaping the shell plates and fitting them up. Simple welded connections were used in place of the castings and complicated riveted connections ordinarily found in a wye.

Details of the model built for the test are shown in Figure 2. The transition section is formed by portions of two right cones, the shell plates of which are welded along the center to a U-shaped plate or yoke. Opposite sides of the yoke are connected by tension members consisting principally of hollow tubes. All these members have the same cross-sectional area and the spacing is such that all are equally stressed. The welded connections at the ends of the tubes are simple and effective. Heads used for the test consisted of flat circular plates reinforced by channel stiffeners. The branches of the wye were made long enough so that the restraint produced by the heads would not affect the stresses in the vicinity of the transition section.

The material used in the shell of the model consisted of steel plates of flange quality having a nominal thickness of 7/32 in. and an average measured thickness of 0.230 in. The yield point determined from standard test specimens was 39,950 lb. per sq. in. and the ultimate strength was 61,210 lb. per sq. in. All welding was done by the shielded-arc process. Seams in the shell plates were made by butting the squared edges of the plates together and applying a penetrating bead from each side of the joint. Experience has proved that this type of joint is

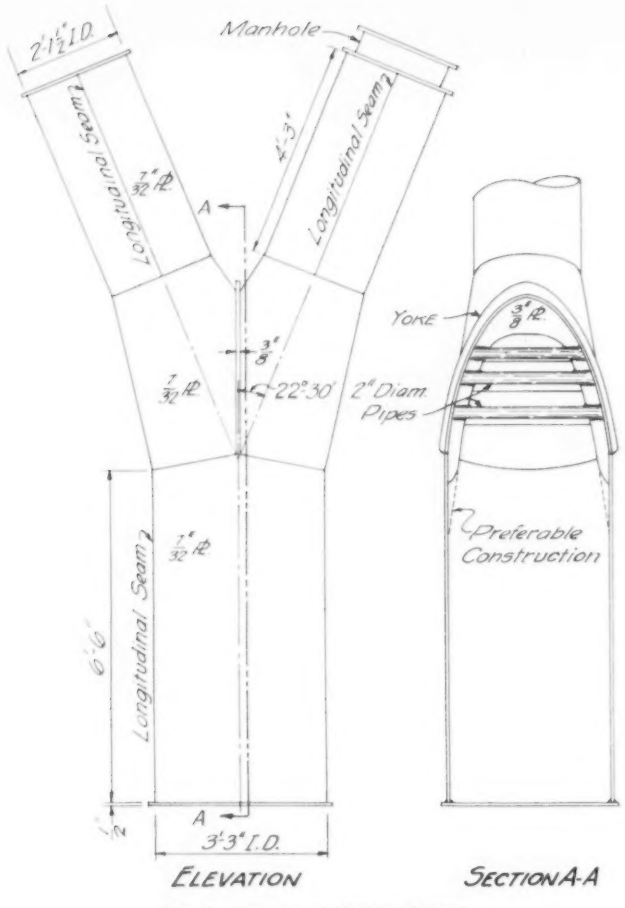


Fig. 2. Details of Welded Model.

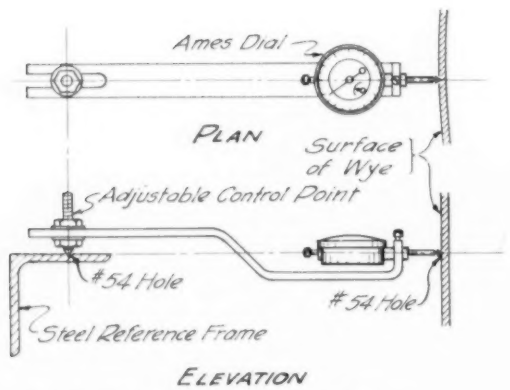


Fig. 3. Method of Measuring Deflections.

very effective for plates having a thickness of ¼ in. or less. Before starting the test, the wye was thoroughly wire brushed to remove all mill scale, and a coat of whitewash was applied to the surface.

Method of Testing

The test of the model was divided into two parts. The first consisted of observations to determine whether any permanent distortion would result from stressing the plate in the main branch almost to the yield point, while the second consisted of a test to destruction to find out how failure would occur and what the maximum pressure would be.

During the first part of the test, deflections normal to the surface of the shell were measured at points where such deflections would obviously be the greatest. This was done by measuring the distances from various points on the shell to corresponding points on a stationary steel reference frame. All measurements were made with an instrument equipped with an Ames dial, reading directly to 0.001 in. Since the deflections to be measured were relatively large, the accuracy obtained with this instrument was all that was required. The instrument and the method of using it are illustrated in Figure 3.

Figure 4 shows the wye and the steel reference frame in place for the test. The wye was filled with water the previous day so that both water and steel would have ample time to reach room temperature. Before applying pressure to the model, initial readings were taken at all points where deflections were to be measured. A second set of readings was taken after a pressure of 370 lb. per sq. in. had been applied by means of a hand pump. At this pressure the computed circumferential stress in the shell of the main branch was 33,200 lb. per sq. in. After releasing the pressure, a third set of readings was taken to determine whether any permanent distortion had occurred. The measured deflections are plotted to scale in Figure 5. It is apparent from these curves that the wye became oval shaped at the junction of the main branch and the transition section when pressure was applied. The greatest outward deflection, which occurred at the sides, had a value of 0.117 in., while the greatest inward deflection took place near the end of the yoke in the main branch, the magnitude being 0.054 in. The greatest permanent distortion, found by comparing the third set of readings with the initial set, was 0.001 in. Since this value was just equal to the accuracy of the instrument used for measuring the deflections, it was concluded that

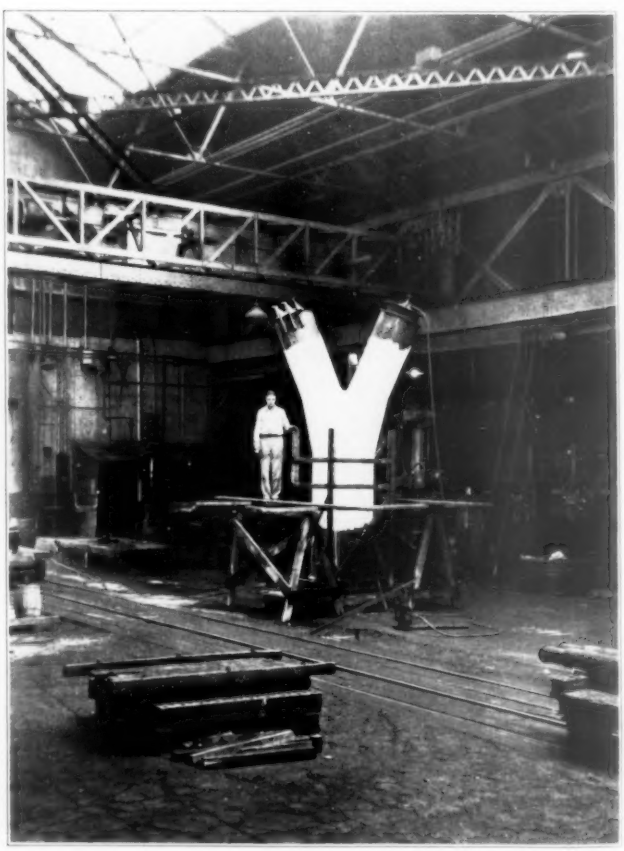


Fig. 4. Wye and Steel Reference Frame in Place for Test.

no permanent set had taken place at any of the points where deflections were measured. A careful inspection of the whitewashed surface failed to disclose any indication of flaking at any point.

In the second part of the test pressure was applied slowly until the wye failed. After the yield point had been passed, the hand pump proved to be ineffective and

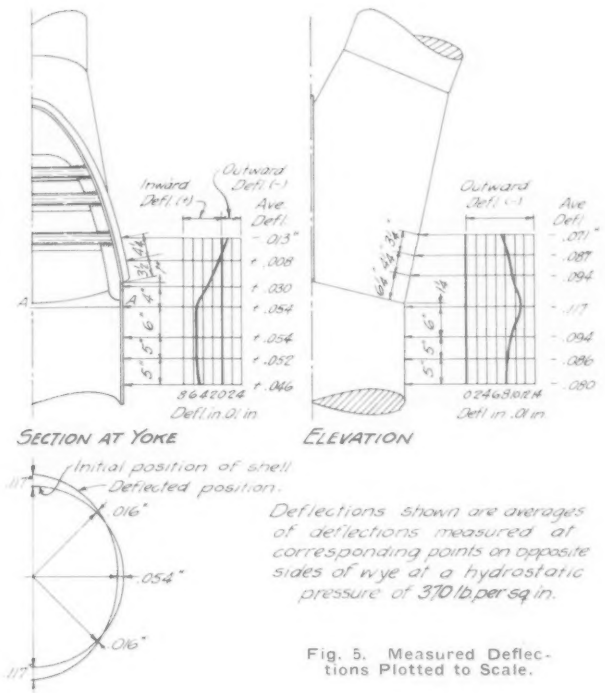


Fig. 5. Measured Deflections Plotted to Scale.

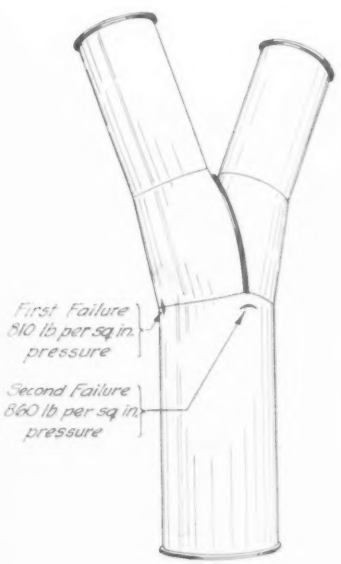


Fig. 6. The First Fracture, 3 In. Long, Was Repaired by Welding. The Second Fracture Was Also Welded and Covered With a Pad Plate. The Third and Final Failure is Shown in the Illustration on the Cover of This Issue.

pressure was supplied by a line from a hydraulic press. Failure occurred by tearing of the shell plate at the junction of the main branch and the transition section when a pressure of 810 lb. per sq. in. had been reached. The break in the plate was about 3 inches long and the damage was so slight that it seemed desirable to repair the break and repeat the test to see whether the plate would again fail at the same place. The break was repaired by chipping out some of the metal and rewelding. The second failure occurred in the main branch plate at the end of the yoke at a pressure of 860 lb. per sq. in. The restraint of the yoke caused a sharp bend in the shell plate at this point. The location of each of these failures is shown in Figure 6.

The break in the plate caused by the second failure was repaired in the same manner as the first and a pad plate was welded over it. A similar pad plate was welded to the shell at the corresponding point on the opposite side of the wye. Pressure was again applied and this time a more determined failure took place at a pressure of 880 lb. per sq. in. The break apparently started at the edge of the pad plate and continued as shown in the illustration on the front cover of this issue. One of the tubular members in the yoke failed in tension at the same time.

Unduly High Stresses at Failure

When the maximum pressure of 880 lb. per sq. in. was reached, the inside diameter of the main branch had increased from 39 to 42½ in. Using this value, the computed circumferential stress in the shell plate at failure was 82,000 lb. per sq. in. and the longitudinal stress was half this value, or 41,000 lb. per sq. in. This was quite surprising since the ultimate strength indicated by the initial control specimens was only 61,210 lb. per sq. in. The 1000-lb. gage used for measuring the test pressures was immediately checked against a master gage to make sure that the readings were not in error. It was found to read correctly at all pressures. The increase in the strength of the shell plate over that indicated by the control specimens may be attributed in part to the effect of cold working upon the physical properties of the steel. After the test, two control specimens were cut from the plate of the main branch. A comparison of the results obtained from these specimens with the results obtained from the two initial specimens from the same plate is given below.

Property of Material	No. of Control Specimen	Specimens Cut from Plate before Fabricating	Specimens Cut from Plate after Test	Per Cent Increase
Yield Point, lb. per sq. in.	1	39 850	57,800	
	2	40,050	63,500	
	Average	39,950	60,650	52
Ultimate Strength, lb. per sq. in.	1	60,350	70,100	
	2	62,070	71,200	
	Average	61,210	70,650	15

The unit stresses in the table are based on the original cross sectional areas of the test specimens. In order to secure truly comparative results, all specimens were pulled at the same speed in the same testing machine.

Discussion of Test Data

Although the ultimate strength indicated by the final specimens was 70,650 lb. per sq. in., this value is still not great enough to account for the 82,000-lb. unit stress in the shell plate at failure. It would seem that the shell plate should fail at a lower unit stress than the control specimens because tests of wide steel plates* have indicated that such plates do not develop unit stresses as great as standard control specimens of the same thickness. This leads naturally to the idea that a plate stressed in two directions may be stronger than a plate stressed in one direction only.

Several theories dealing with the manner of failure of

*Tests of Joints in Wide Plates, Bulletin No. 239, Engineering Experiment Station, University of Illinois, Urbana, Illinois.

a material have received a great deal of attention. One of these, known as the maximum strain theory, is based upon the assumption that a material fails when it has reached some limiting deformation rather than some limiting stress. If this assumption is true, a material will have a greater ultimate strength when subjected to two tensions at right angles than when subjected to a single tension because the deformations along one axis tend to reduce the deformations along an axis at right angles by an amount depending on Poisson's ratio for that material. The value of this ratio probably changes as the yield point is passed. At the present time it is impossible to express the relations between deformations and stresses at failure in mathematical form because the amount of experimental data relative to the plastic deformations of a material stressed beyond the yield point in two directions is very limited. It is interesting to note that the wye failed shortly after the longitudinal stress had passed the yield point. A carefully planned series of tests on cylindrical and spherical containers several feet in diameter and having thin shells with welded seams would undoubtedly give some valuable information in regard to the manner of failure of the shell plates.

Sufficient Strength Without Reinforcing Bar

The results of the test seem to justify the conclusion that the wye was properly designed in nearly all respects. Before the test it was thought that the sharp change in direction of the shell plate at the junction of the main branch and the transition section might prove to be a source of serious weakness. The usual procedure at such a place would be to weld a circumferential reinforcing bar to the outside of the shell to provide additional section. In this case, however, it was thought desirable to leave the bar off just to see what would happen. Although the initial failure occurred at this point, the high stresses attained before failure indicated that the strength of the wye was not materially reduced by the omission of the reinforcing bar.

The break in the plate of the main branch at the end of the yoke is an example of failure due to local restraint. In this case, the restraint produced by the end of the yoke caused a sharp reverse bend in the shell plate and rupture occurred at this point. This defect in the design can be corrected by extending the end of the yoke and tapering it as shown by the dotted lines in Figure 2, thus providing a gradual change in section.

Saving in Labor and Material

The advantages gained by using welded construction for a container of this type are so nearly self-evident that very little explanation is required. Briefly, welded construction reduces the amount of labor involved in detailing the wye, simplifies the fabrication by eliminating complicated riveted connections and castings, and saves material by eliminating the butt straps. In addition, the stress distribution in the shell plates is more favorable because the thickness is uniform.

In closing, it should be mentioned that a test of the type described would have been almost impossible with riveted construction. Leaks would have developed long before failure was reached and it would have been impossible to make the vessel fail at any place other than in the riveted seams.

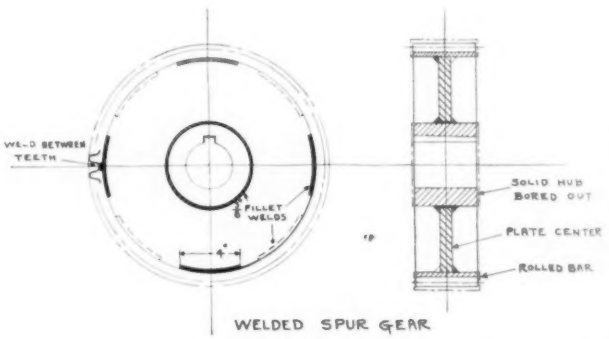
Comments on Design of Welded Spur and Bevel Gears

By C. S. Lincoln

In an interesting article in the July issue of *The Welding Engineer*, G. B. Cramp brings out some very good points in connection with the detailing of welded machine parts and the ordering of the material. However, his method of fabricating a welded spur and miter gear, in which the web of the gear extends through and forms the center third of the teeth, the other two-thirds being made by welding a ring on each side of the web, using an intermittent weld, is very wasteful of material and does not represent the best construction.

In this kind of design, the teeth of the gear are made of three different pieces of material whose physical characteristics may be different. This, however, is not the most important disadvantage.

A gear of this kind is sure to have lubricant seep through the joints between the plates. There being no finish between the plates, the scale will work loose due



WELDED SPUR GEAR

to the action of the lubricant plus the vibration. This scale may work into the space between the gear teeth and cause excessive wear.

The intermittent welds, with considerable space between them, may cause the gear to be very noisy, particularly if it is a high-speed gear.

As an alternate to this design, and one which can be made in a well-equipped shop, we would suggest a rolled ring welded on the outside of the web and a considerable reduction in the thickness of the web, as shown in the accompanying drawing.

The miter gear as shown I feel sure cannot be economically constructed by welding, the design having all the objections of the spur-gear design. If the miter gear is to be made for an emergency job where a quick delivery is important and no pattern is available, it could best be cut from one or two solid plates. I doubt that the amount of welding and cutting shown is ever justified in producing this part.

To Organize Association of Acetylene Equipment Men

Acetylene equipment repairmen, whose business is principally the repairing of acetylene welding equipment, are asked to communicate with Roy Thomas, 1637 E. Vernon Ave., Los Angeles, Calif., with the object in view of forming a nation-wide non-profit-making society of repairmen from which the membership can obtain mutual benefit. Suggestions and proposals for the betterment of the society are solicited.

Uncle Sam Wants a Welding Metallurgist

The United States Civil Service Commission announces an open competitive examination for associate physical metallurgist (welding). Applications for the position must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than December 13, 1932.

The examination is to fill a vacancy for temporary employment in the Ordnance Department at large, Watertown Arsenal, Mass., and vacancies occurring throughout the United States in positions requiring similar qualifications, either for temporary or permanent employment.

The entrance salary is $3,600 a year, less a furlough deduction of 8⅓% and retirement deduction of 3½%.

Applicants will not be required to report for examination at any place, but will be rated on their education, training, and experience, and on writings to be filed with applications. Applicants must have been graduated with a bachelor's degree from an institution of recognized standing, with major work in chemistry, physics, engineering, or metallurgy, and must have had certain experience, including at least one year in research work on ferrous welding problems.

Full information may be obtained from the Secretary of the United States Civil Service Board of Examiners at the post office or customhouse in any city, or from the United States Civil Service Commission, Washington, D. C.

Pneumatic-Tired Rail Car Features Shot-Welded Stainless-Steel Construction

The pneumatic-tired rail car, which was developed in France several years ago and has recently been introduced into this country, has the advantages of high speed, comfort, and quiet operation. In addition to these qualities, the car shown in the illustration is of very light weight compared with the conventional rail car. It was recently built for the Reading Company and is a 125-hp. Budd-Micheline car, and the first Diesel-electric pneumatic-tired rail car to be purchased in America.

The car is powered with a Cummings Diesel engine directly connected to a Westinghouse 250-volt generator, which furnishes the electric current to drive a high-speed Westinghouse motor connected to the front and rear axles of the rear truck through a 9:1 Timken differential worm.

An interesting feature of this car is its all-stainless-steel construction, including the trucks, which are shot welded by the process described on page 25 in the August, 1932, issue of *The Welding Engineer*.

The front, or power, truck carries the Diesel engine, generator, batteries, and control, and the rear, or traction, truck has the driving motor mounted under the bolster.

The car weighs approximately 22,000 lbs. and has a capacity of 47 passengers. Its normal speed is 50 to 55 miles per hour. The tires are 33x4½ and carry an air pressure of 95 lbs.

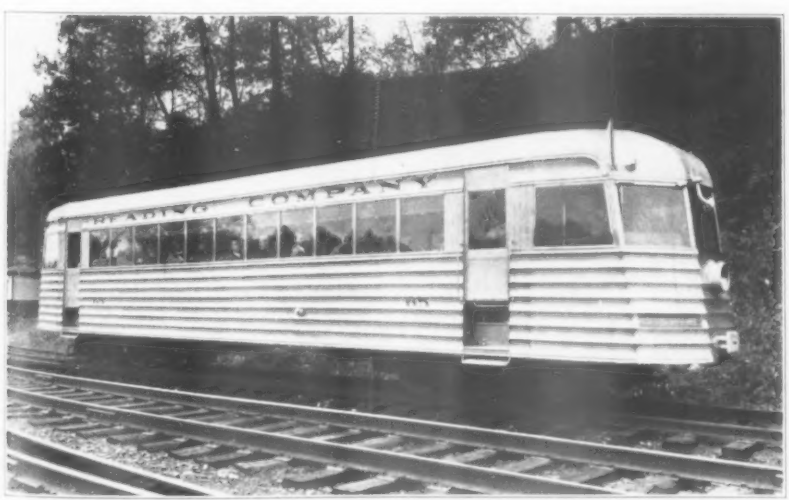
The total weight of the power truck, including engine and motor, is 6,990 lbs., and the shot-welded stainless-steel frame alone weighs only 281 lbs. The high tensile strength of the stainless steel results in a considerable saving in metal and weight.

The shot-welded stainless-steel frame of the traction truck weighs 230 lbs., while the entire truck, including the motor, weighs 4,315 lbs.

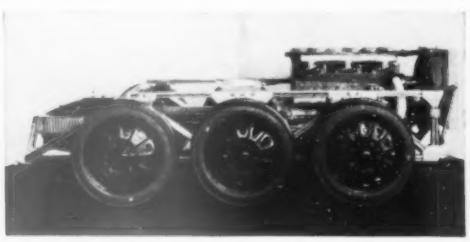
The fundamental development work of the E. G. Budd Manufacturing Company in handling and forming of thin sheets of steel, the far-reaching research into welding methods, the fineness of control, all contribute to make the car and truck construction revolutionary. Relatively overnight, the weight of a self-propelled car of a given seating capacity has been reduced to 33% of the weight of the conventional passenger coach having no power, as used on Class 1 roads.

Indirect artificial light is used in the car, and the windows always remain closed, since a ventilating fan takes air from the outside and distributes it along both sides of the car, so natural ventilation is not required or even desirable.

The high degree of riding comfort attained in this type of car has stirred up such great interest that a double-unit car of similar construction is now being built.



This Rail Car, Equipped With Pneumatic Tires and Shot-Welded Stainless-Steel Trucks, Weighs Only Two-Thirds as Much as the Conventional Passenger Coach.



The Welded Front Truck Carries the Power Plant.

The High-Speed Driving Motor Is on the Rear Truck.

Welded Aluminum Tanks—

are cheaper, have tighter joints, and are easier to keep clean than riveted vessels, according to experience of soap manufacturer

By W. E. Archer

A VERY striking and attractive job in aluminum welding, completed with highly satisfactory results, was the recent fabrication of three welded aluminum tanks, each 12 ft. high and 11 ft. in diameter, by the Southwest Welding & Manufacturing Company, of Alhambra, Calif., for the Los Angeles Soap Company to be used in the process of making the well-known brand of White King soap.

Aluminum was selected as the material for these tanks, according to engineers for the soap company, not so much on account of its resistance to corrosive action, as to reduce the tendency for discoloration in the liquids which the tanks are to contain. The objection to steel tanks for this use, as has been found in past experience by the soap manufacturers, is that the cocoanut oil and tallows become discolored by taking up some of the corrosion stain of the steel tanks, which, of course, is objectionable in that the finished product is desired to be as nearly white and free from dark discoloration as possible. It was found that by the use of aluminum tanks little or no take-up in color by the oil and tallows resulted.

Welded Construction Specified

Welded construction of the tanks was specified for three special reasons: First, considerable saving in construction costs was realized over any other type of construction. Second, welded construction has been found to afford tighter joints and consequently gives less chance for corrosive action and results in longer life for the tanks. Third, by avoiding rivet heads, cleaning of the tanks is made a simpler and easier task, thus assuring a greater degree of sanitation within the tank. Welded construction also provided added strength over riveted construction; however, this feature was not of prime importance in this case, as the tanks are of the open-top type and not to be subjected to pressure.

Quarter-inch standard grade of duralumin plate was used throughout in the construction of these tanks, the bottom heads of which were made conical and were installed in a cone-shaped concrete foundation specially built to fit the shape of the heads. The conical shape of heads facilitate emptying of the tanks.

Each head was fabricated by the assembly of from six to eight sections of plate, the number depending upon the type of bottom, its design for outlet connections, etc. All edges of the plate (both for the heads as well as for the shells) were prepared for welding by shear beveling to an angle of about 30°. The sections, after being formed to their proper shape, were preheated for the welding operation in a specially built furnace and assembled by tack welding. In this operation, about 2-in. tack welds were made along the seam about 7 or 8 in. apart.

Welding Procedure

Butt joints were employed in the assembly of the plate for both the shells and the heads, and both were welded under the same method of procedure as described further in this article. All welding was by the oxyacetylene process, using ¼-in. special duralumin welding rods and duralumin flux. The flux was prepared fresh each day and used from a deep tube-like container, according to

standard practice in work of this kind. Complete penetration was obtained by using a strip of ½x2-in. copper for a back-up plate. The small amount of protruding metal which formed on the inner side after the welded seam was completed was then chipped, leaving a smooth, even surface, free from small holes or faulty spots.

Fabrication of the shell was completed as follows: The plates for each ring of the shell were butt welded in one long plate to complete the circumference of the tank. Following this operation, the two plates were laid on specially prepared blocking with the copper back-up bar secured at the seams and tack welds laid along the full length. Following the tacking, preheating torches were applied evenly underneath the plates, and the final butt-welding operation was then started and carried through to completion. The completed single plate was then put through bending rolls to form the shell, after which the one final longitudinal weld was made under exactly the same heat control procedure, to form a complete welded shell ready for the tacking and welding of the conical head.

The edges of the conical heads were joined to the shell of the tank by being flanged out 2 in., which made them come even with the shell. The shell and head were then butt welded together, expansion and contraction being controlled in this operation by preheating with large natural-gas blow torches specially prepared for this purpose. The outer flanged edge of each tank is formed of 2½x2½x¼-in. steel angle iron cold riveted to the top edge of the shell with duralumin rivets.

Heating Coils Also Welded

Heating coils of different types, as shown in the illustration, were also welded, being constructed of seamless duralumin tubing. Allowances for expansion and contraction in these coils were provided by allowing the coils to move in the clamp-like holders, thus providing extreme flexibility. At the outlet of one of the tanks, a special loop in the tubing is seen, which takes care of the contraction and expansion at that point.

All tanks and coils were fully tested for leaks at the welded seams before shipment, and were found in each case to be water-tight on the first test. The coils were tested by a pressure water test, while the tanks (being of the open-top type) were merely filled with water and the seams examined for leaks, which was deemed a sufficient test. Highly satisfactory results were obtained by this method and procedure of fabricating these tanks.

The smooth, uniform surface of the tanks and their perfectly regular, even symmetry show remarkable skill on the part of their builders. The procedure followed in assembling the main shell, together with the method of controlling contraction and expansion during the welding, proved the correct means of eliminating warpage and distortion. Welding the sections into one plate and rolling the entire shell in one operation resulted in a smooth surfaced shell, regular in shape in every respect. The elimination of warpage, distortion and other irregularities in the finished surface of a welded aluminum article is a serious problem, which, as in the case of these tanks, can be solved by using the correct procedure.

Construction of these tanks was under the supervision of Ben Gritzmaker, superintendent of production for the Southwestern Welding & Manufacturing Company, assisted by Ernest Peters, welding foreman.

Chicago Section A.W.S. to Hear Talks on Welding Exhibits and Clad Steels

Talks on the proposed welding exhibit at the Rosenwald Museum of Science & Industry and on stainless clad steel will feature the meeting of the Chicago Section of the American Welding Society, to be held Friday evening, Nov. 18th in the Palmer House. O. T. Kreusser, Director of the Rosenwald Museum will give an illustrated lecture on the value of the Museum in spreading knowledge of industrial processes and will discuss proposed exhibits and demonstrations of welding materials and welded construction, including a description of a welded model of a coal tipple to be exhibited at the Museum. "Stainless Clad Steel" will be the subject of a talk by W. W. Patrick, Chief Metallurgist of the Newcastle mill of the Ingersoll Steel & Disc Company at the same meeting.

The meeting of the Chicago Section held on October 21st was attended by about sixty. H. C. Boardman of the Chicago Bridge & Iron Works gave a very interesting illustrated lecture on the design and fabrication of steel tanks, which was followed by a discussion.

◆

Welding of Non-Ferrous Metals Will Feature Los Angeles Meeting

The program for the November 17th meeting of the Los Angeles section, American Welding Society, includes two lectures on the welding of non-ferrous metals and alloys. Aluminum and its alloys will be the subject of a talk by J. R. Schmidgall, sales engineer, Aluminum Company of America, and brass, bronze and their alloys will be covered by G. T. Piersol, sales engineer, The American Brass Company.

At the meeting of the Section on October 20th, an interesting talk was given by H. B. Rice, sales manager of the Metal Spray Company, of Los Angeles, on the subject of "Metal Spraying and Its Influence Upon the Welding Industry." Mr. Rice gave specific applications of metal spraying in combating corrosion and building up worn surfaces. He also described how cracked water jackets are being salvaged; how worn pistons and cylinders are built up; and many other applications.

◆

Program of Purdue Conference

The conference on welding to be held at Purdue University, Lafayette, Ind., on December 8th and 9th will consist of exhibits, demonstrations, and talks of interest to users of electric or gas welding in manufacturing, maintenance and repair operations. Programs will be available from the Engineering Extension Department of the University about December 1st.

The subjects tentatively listed for this conference include the following: "What is New in the Welding Field;" "How Far Have We Gone in Structural Welding?" "Recent Developments in the Electric Welding Field;" "Welding Copper;" "How Welding Has Affected our Manufacturing Business;" "Cutting Various Metals with Gas;" "Metal Spraying and Its Application;" "How Welded Joints Act;" "Safety Practices in Welding;" "Pre-Qualification Tests for Welders;" "Typical Applications of Resistance Welding;" and "Field Welding of Tanks."

After considering cost, quietness in construction, and rigidity, the Sugarland (Texas) School Board decided on a welded building to house the new gymnasium and swimming pool

All-Welded School Building

By Albert H. Weth
Structural Engineer

ONE of the latest additions to the increasing number of all-welded steel frame structures is the new gymnasium and swimming pool building of the Sugarland Independent School District at Sugar Land, Texas.

Sugar Land, one of the most up-to-date model towns in the United States, is owned and operated by the Imperial Sugar Company, the first sugar refinery in Texas. It is situated in the fertile valley of the Brazos River about 26 miles from Houston, the largest city in the state. Through the generosity of the owners of Sugar Land —W. T. Eldridge, Sr., and I. H. Kempner—and the constructive leadership of M. R. Wood, president of the school board and consulting engineer for the Sugarland Industries, the school system has become one of the best in the entire state of Texas.

This new building completes the high school group of individual class-room buildings and has an overall length of 140 ft. and a width of 89 ft. The height of the gymnasium from the floor to the top of the parapet wall is 31 ft. and of the swimming pool building 21 ft.

The foundation is designed as a continuous reinforced-concrete beam with such a width that the soil pressure is not more than 2000 lb. per sq. ft. at any place. The soil here is a heavy black clay which cracks upon drying. These cracks, which are often more than 8 ft. deep and 3 to 4 in. wide, fill up with dirt. When the rainy season starts, the soil soaks up water and swells and moves in all directions. This causes the cracking of many foundations which are not properly reinforced against any soil movement or have no other provision to take care of it. Therefore, in addition to the reinforcing, the foundation is underlaid with 2 in. of sand and has a 4-in. sand cushion on both sides. Alongside the swimming pool, the foundation has under each column a concrete pier 18 in. in diameter, which extends 12 in. below the bottom of the swimming pool. This extra precaution was taken to guard against any caving under the foundation during the excavation of the swimming pool, which walls are only 24 in. from the outside of the foundation.

Much thought and study were given to the design of the structural steel frame. All-welded construction was considered because of the location of the building in the center of a group of school buildings and not more than 200 ft. from the hospital of the Sugarland Industries. After a thorough study, not only in regard to cost, but

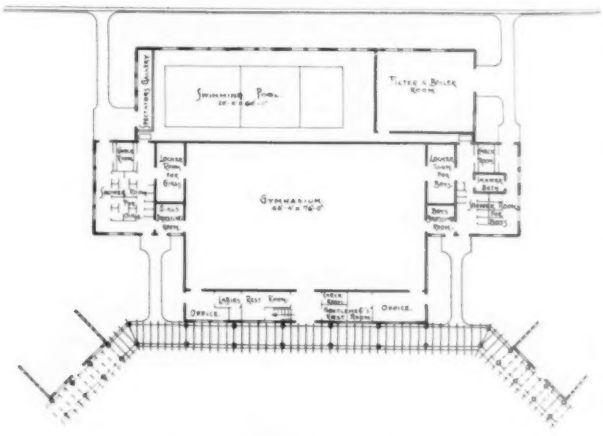
ITEMIZED COSTS OF WELDING OPERATIONS ON SUGARLAND SCHOOL

Shop Welding

Current consumption (no record).	
Wire:	
Bare, 150 lb. @ 9c	$ 13.50
Coated, 353 lb. @ 20c	70.60
Labor:	
Total length of welds, 1025 ft. @ 17.6c	180.40
Welding speed, 6 ft. per hour.	
Total cost (minus current)	$264.50
Cost per foot of weld, 26c.	

Field Welding

Current consumption, 630 kw-hr. @ 2c	$ 12.60
Wire:	
Bare, 325 lb. @ 9c	29.25
Coated, none.	
Labor:	
Total length of welds, 489 ft. @ 30.9c	151.10
Welding speed, 3.57 ft. per hour.	
Total cost	$192.95
Cost per foot of weld, 39.5c.	
Total cost for shop and field welding (exclusive of current consumed in shop)	$457.45
Total cost per ton of steel	$8.03



Plan Drawing of New Sugarland School Building.

also to stability, since most of the gymnasium equipment is suspended from the trusses, it was found that the welded structure would not only be cheaper, but could easily be made more rigid than the riveted. In view of these facts, and also to eliminate the noise of riveting, the welded structure was considered the ideal solution.

A considerable amount of the structural-steel welding was done in the shop to eliminate as much field welding as possible. The column plates were welded directly to the columns. Gussets for wind braces were cut out of I-beams and welded in the shop to the girder beams. This eliminated many clip angles.

The trusses for the gymnasium (59-ft. span) were completely welded in the shop. The bottom and top chords were made out of a 12-in. I-beam cut in two along the center line of the web. All the other truss members—single angles—were welded directly to the top and bottom chord without gusset plates. The trusses were designed to carry, in addition to the roof load, the suspended gymnasium equipment consisting of nine swinging loads of 150 lb. each at different points on each truss.

Every welder before being permitted to work on the job had to pass a qualification test on three longitudinal-shear specimens of fillet welds, two in the horizontal position (one with bare and one with coated wire) and one

Views During Erection of Steel Framework.

in the vertical position with bare wire. A. W. S. specifications were followed in the preparation and testing of the specimens.

All erection of steel and welding was done in 15 working days.

The whole building, with the exception of the roof deck and the floor of the gymnasium and all doors, is constructed of fire-proof material. The outside walls of the gymnasium and swimming pool are built of interlocking tile. All inside partition walls are brick or metal. The outside of the building is finished with a two-coat cement plaster and a splash coat of Atlas white cement.

The gymnasium roof is a 2-in. T. & G. wooden deck, and the roof of the swimming pool building is a 3-in. reinforced concrete slab. Both are covered with a four-ply-felt tar and gravel roofing. The underside of the roof deck and all exposed steel in the gymnasium has a finishing coat of aluminum paint.

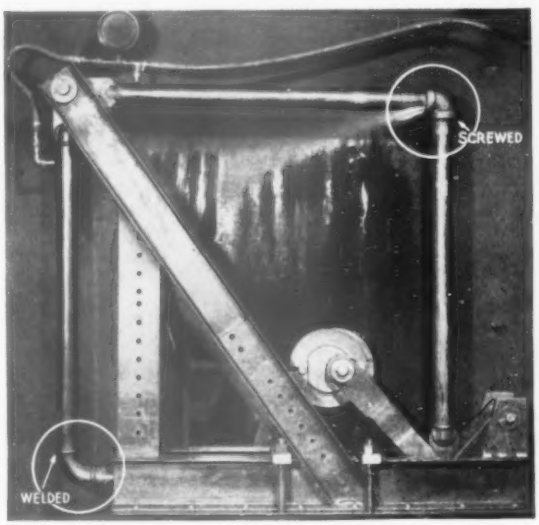
All the windows are Truscon steel sash with copper screen and those in the gymnasium and swimming pool room have a heavy wire guard on the inside.

The building was designed by the writer, in the engineering office of the Sugarland Industries, with M. R. Wood as consulting engineer. The general contractor for the building was the Shields Bros. Construction Company of Houston and Sugar Land, Texas. The structural steel was fabricated, erected and welded by the Houston Structural Steel Company of Houston, Texas.

Testing Welded and Screwed Pipe Elbows in the "Torture Rack"

The "torture rack" illustrated below was designed and built by the Taylor Forge & Pipe Works, Chicago, Ill., to simulate as nearly as possible the effect of expansion and contraction in pipe lines where certain parts of the line are fixed so that expansion and contraction strains are concentrated in the elbows.

The pipe on one side of the rack has a welded elbow, while that on the other side has a screwed elbow. As the eccentric revolves, the elbows are deflected, thus imposing equal stresses at the screwed and the welded joints shown



After 26 Deflections in This Test Rack, the Screwed Joint Started to Leak.

in the two white circles. With this device as many deflections can be obtained in one day as would normally occur in a steam pipe line in 50 years. Standard 3-in. pipe was used and an internal pressure of 90 lb. per sq. in. was maintained at both elbows.

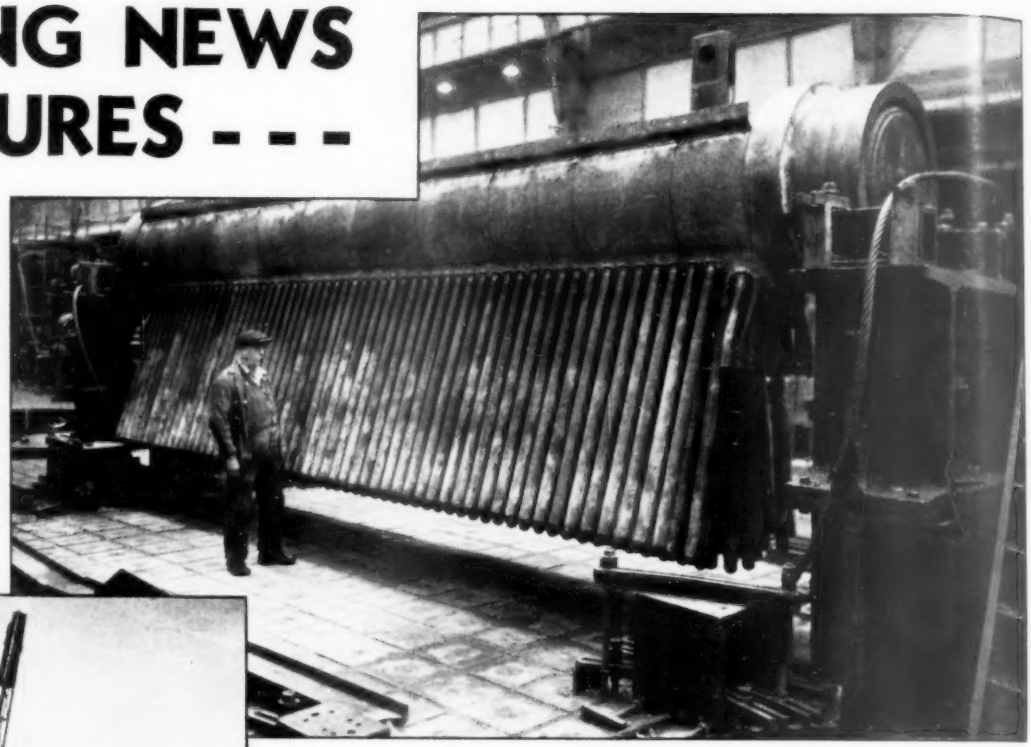
All pipe threads and elbow threads were carefully examined and found to be perfect before the test started. But after 26 deflections, the screwed joint leaked badly, as the illustration shows. To the surprise of those making the test, the welded joint weaved on and on to 400,000 deflections and was still tight when they gave up trying to break it down.

British Oxygen Merger Announced

An important industrial merger is about to take place between the British Oxygen Co. and Metal Industries, Ltd., of Glasgow. A circular has been issued to stockholders of the British Oxygen Co. announcing the suggested merger. Full details will be announced in a month's time.

The capital of the British Oxygen Co. is £2,000,000 and the firm employs nearly 3,000 people in its 10 branches throughout the country. It is also proposed to increase the authorized capital of the British Oxygen Co. to £2,500,000 by the creation of £250,000 of new ordinary shares. The directors state that the actual purchase consideration will be satisfied almost wholly in ordinary shares. They are satisfied that the agreement is one from which considerable advantage to the firm will result.

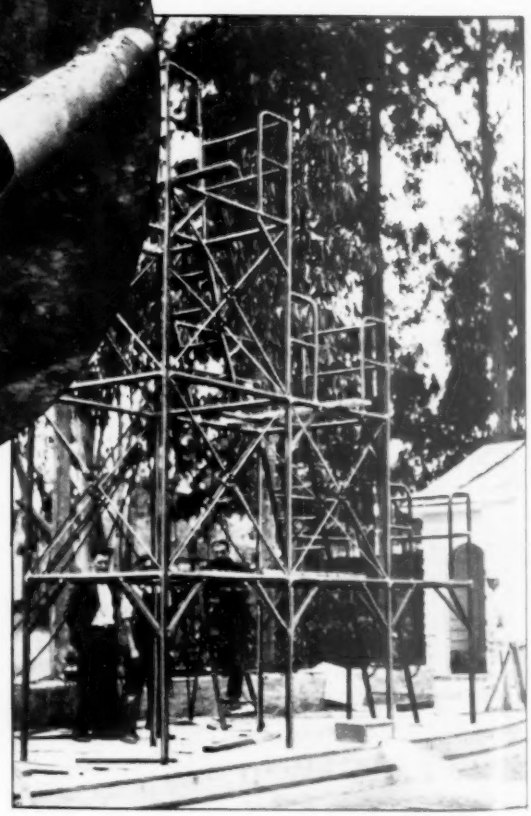
WELDING NEWS IN PICTURES - - -



The advantages of the mercury boiler in increasing the economy of large power plants is made possible only by welding. This shows one of the seven all-welded porcupine-tubed mercury boilers soon to be installed in the power-generating station of the General Electric Company at Schenectady, N. Y.

This all-welded crane boom built up of steel tubing is 100 ft. long and is being used in the electrification project of the Pennsylvania Railroad between New York and Philadelphia. This boom was built by the Harnischfeger Corporation and is on a P & H Model 575 crawler crane.

The arc-welded joint held, but the pipe didn't. The nearest weld to the break is where the man is standing on the pipe. The rupture tore a great hole in the ground. (Courtesy of the Lincoln Electric Co.)



This diving platform of all-arc-welded tubular construction is on the estate of E. L. Cord, prominent automobile manufacturer, at Beverly Hills, Calif. It was fabricated from 1½ and 2 in. pipe, using equipment manufactured by The Lincoln Electric Co.

Building a Job Welding Business

By W. Irving Brockson

XV—Extending Credit and Making Collections

(The next and concluding article in this series on the Job Welding Shop will deal with the handling of employees.)

"GET the Money."

This is the objective of every business organization whether it be a grocery store, a railroad, an automobile company or a welding shop. Strange as it may seem, however, many business men who are experts in most phases of their particular enterprises are frightfully weak at getting the money from customers.

From some standpoints, a cash business is the most satisfactory kind to operate. There are no elaborate accounting systems necessary, no uncertainty as to when collections will be made, and no credit losses.

Despite these advantages, it is not always possible or even desirable to do a strictly cash business. Speaking generally, credit when properly used is one of the most helpful and important tools of commerce. This is still true today despite the drastic changes which have taken place in business operations since 1929. In this country, if banks and other institutions could not receive and extend credit, our entire economic structure would have to undergo vast and fundamental changes.

Due to conditions in the local community and because of dealing with many large companies, the welding shop finds it necessary on many occasions to do work on a deferred-payment basis. Because at least a share of his business must be done on open account the job shop operator should be thoroughly familiar with the practices and policies followed by the most successful firms, in other lines of business as well as his own, in extending credits and making collections.

Have an Understanding on Terms

One of the best ways to avoid misunderstanding and trouble is to have a definite agreement with the customer as to how payment is to be made before a torch is ever lit on the job. If it is practicable to have this understanding in writing, so much the better. This "meeting of minds" in advance is more necessary now than ever before, because today even the large, well-rated concerns frequently delay payment of bills beyond a regular expected settlement period.

Solicit Accounts in Sound Financial Condition

To some extent it is possible to control the kind of accounts which come to you for credit. This can be done in a measure by directing all of your business solicitations, either by personal efforts or by various forms of advertising, to those firms which you know to be in sound financial condition. As a rule, it is shortsighted to spend personal effort or money in advertising on firms which you would not trust if they should come to you and ask for credit. Go through your prospect list carefully and concentrate your sales efforts on those whose financial position is sound.

Get as Much Information as Possible

Before extending credit to any merchant or firm, you should have as much information as possible about their financial standing. There are several sources from which this information may be obtained. One of the best-known sources is the commercial rating books such as Dun's and Bradstreet's. However, it is not likely that the average welding establishment will want to go to the expense of subscribing for these books. They may, however, be referred to in the office of your banker.

If you stand well with your banker, he will not only allow you to look at his credit reference books, but will gladly exchange information about the general standing of firms in which you may be interested. You cannot expect him to divulge confidential information, but he will have many general facts which will be useful to you.

Naturally you will have several friends in other lines of business who will be glad to talk about mutual prospects. It often happens that the experience which some other line of business has had with a given customer will give you a very good idea of his credit standing.

Local credit bureaus have come to play an important part in the credit structure of the communities where they exist. Usually these bureaus operate for the benefit of members only and there is a membership fee; but if one has a great deal of credit business to do, the fee is a good investment. These organizations are usually cooperative affairs and the cost of information is relatively low.

Learn to Judge Men

Nevertheless, after you have gained all the information you can from the above and other sources, your final action must depend upon your own judgment of the individuals and companies involved. After a little experience in the credit business, your own judgment as to the capacity of a client to pay will become more dependable

It should be borne in mind in all transactions wherein credit is extended or refused that the decision must be based upon an estimate of *men* and *character* as well as upon a report of assets and liabilities. Men, not physical assets, pay or refuse to pay bills. Character and ability of men—not machines and equipment—determine the success or failure of a company. Consequently, the job welding shop owner desiring to be more proficient in handling the credit and collections end of his business should take advantage of every means to improve his efficiency in making accurate estimates of men.

Dealing With the New Company

The kind of concern which requires the most care and study in the matter of extending credit is the new company just starting in business. Now that general business conditions seem to be definitely on the up-grade, it is likely that the number of companies beginning business during the next year will be larger than any year since 1929.

New establishments require especial attention because, in the first place, many of them have inadequate capital and inefficient management and as a result have but little chance to succeed. Others have ample funds and capable

executives. Between these two extremes, there are all sorts of gradations. Indiscriminate granting of credit to the first group leads to loss in a high precentage of cases. Failure to grant credit to the second group is likely to mean losing the opportunity to develop good customers.

Approaching the new company on the matter of terms requires a high order of diplomacy and tact because many are very "touchy" on the subject and are likely to be offended if the matter is not handled with good judgment. It is true that some of those who are the poorest risks are the first to "fly off the handle" when questions are asked about their financial standing.

But, in any event, you have a right—and in fact a duty to yourself—to ask your prospective customer who is just starting in business to give you references and to tell you such things as his amount of working capital, property owned, debts outstanding, prospective monthly income and related facts. If the management of the new company is the proper type of business man he will understand why you need the information and usually will give it to you with little hesitation. With the information just referred to in hand you are in a position to decide intelligently whether the company is a good risk or a poor one.

Handling the Company in Financial Stress

Another type of organization which requires very careful handling is the one which, because of financial difficulties, has been on the verge of closing its doors, but due to refinancing or to special arrangements with old creditors or banks is proceeding to do business. Naturally, the exact nature of such arrangements and the chances of the company working out of its difficulties and returning to a sound financial basis vary greatly. If such a company owes you a past-due account at the time it goes into such a period of stress, you, together with other creditors, are entitled to be among the first to know the full facts and to be guided accordingly. If, on the other hand, you have never done business with the firm in this condition and are asked to extend it credit, you should be particularly careful to get complete information before accepting the risk.

Here again you are "between the devil and the deep blue sea"—on one side the chance of losing the value of your time, labor, etc., spent on a welding job, and on the other side, the likelihood of refusing to do business with a concern which may later develop into a large and desirable user of welding shop service.

The Slow-Paying, Well-Rated Concern

A third type of company which has presented a collection problem to the welding shop during the past three years has been the large, well-rated, financially sound corporation, the kind whose solvency is above all reasonable doubt. Many small business men complain that since 1929 such concerns have been very slow in paying their obligations. Apparently they have plenty of cash, but for one reason or another have been sixty to ninety days, or even longer, in settling their accounts. Although it may be unwise to start legal action against such a company for the payment of an account, one is certainly justified in making repeated and firm requests for payment.

The Transient Customer

Some job shops experience considerable credit difficulty with what might be termed transient customers—for example, construction companies with headquarters in a distant city but with equipment being operated near by in the building of a road or bridge, bus or trucking companies with far-off central offices, and similar cases. If the company of this character asking you to do work on time is not well known to you, it is advisable to take special pains to get proper information before extending credit.

After you have extended open terms to your customers the next thing you are interested in is to get your money within the period which has been agreed upon.

Mail Invoices and Statements Promptly

One routine which encourages prompt payment of bills consists first, in mailing an invoice as soon as possible after the job has been completed and, second, in sending statements at the end of every month covering all invoices sent during that particular month. The invoice serves to give the customer a confirmation of your agreement as to the cost of the job and enables him to make a record of what he owes. The statement reminds him of the invoice, or invoices, and is an implied request for payment. Although this routine of invoice and statement is elementary, yet many job shops neglect it.

Granting Discounts for Early Payments

A practice followed in most lines of business to stimulate the prompt payment of bills is the granting of discounts for payment within certain specified short periods of time—for example, cash, ten days, fifteen days, etc. It is obvious that any firm can make a large saving in a year by paying all its bills promptly and taking advantage of the 1%, 2% or other discount granted within the specified time. When such discounts are offered they should be very plainly stated on the face of the bill so that the customer cannot fail to see them.

Despite all the job shop owner may do in the way of checking up on customers before granting credit, having definite understandings as to time of payment, and sending invoices and statements, there are almost always a certain percentage of accounts which are not paid on time and become overdue.

Collecting the Past-Due Account

The task of collecting the past-due account is one which few people relish. It requires just as much tact and good business "horse sense" as the original arrangements for credit. Such accounts must be collected because they are part of your assets and represent loss if not collected. On the other hand, if "hammer and tongs" methods are used in going after the delinquent customer, he may pay his bill but send his future business elsewhere. Your objective in this case is both to get your money and to keep the customer. Somebody has referred to this job as taking the sting from a bee without getting stung.

Whatever plan is adopted should be systematic and painstakingly thought out as opposed to being slipshod and blind. Some concerns have a carefully worked out series of collection letters which are sent to delinquent accounts. The first, which is sent out a few days after the past-due date arrives, is usually nothing more than a reminder of the amount owed. If the first letter brings no response, a second is sent out at a predetermined interval, usually thirty days, and makes a polite but firm request for payment. Should the second fail to "get a rise" from the customer a third and more forceful one is despatched at a shorter interval.

This plan of collection letters is subject to all sorts of

variations in number, contents and in the action taken after the final one is sent. Some companies supplement the letters with telephone calls or personal visits.

Developing a Definite Promise From the Debtor

Whatever the method followed, the objective is to get the cash, of course; but failing that, to get a response and definite promise of a method of making payments. Naturally, you will be more lenient with a debtor who acknowledges your request for payment and makes a definite promise of time of payment than with one who ignores or evades his obligation. Experience has shown that as a rule the man who admits his debt, either verbally or in writing, and specifies a time and method of making settlement is more likely to pay without threat of suit than the man who makes no response to systematic collection efforts.

A carefully mapped out and executed plan to stimulate collections by persuasive means will collect a percentage of the past-due accounts upon which it is used, the percentage varying greatly with many conditions. Nevertheless, there always will be some delinquents who, through lack of available cash, improper management of their affairs, or premeditation will not meet their obligations unless compelled to do so through legal action.

Writing Off or Bringing Suit

After you have carried out your *persuasive* plan with a given customer, and have received no satisfactory response, there are only two avenues open: First, to forget the account and write it off as a loss, and second, take legal action. There may be good reasons why you prefer to follow the first plan; but many of the most successful companies in the country, both large and small, rarely write off an account without first taking legal action. They reason that if they take no legal steps, they have lost both their money and a customer; but if they bring suit they have a chance to get their money, less legal costs.

If you find it necessary to take legal action, it is usually more satisfactory to employ an individual lawyer or a legal agency specializing in collections rather than a lawyer having a general practice. Usually these specialists work on a specified percentage of what is collected.

This whole subject of collections and credits is so very broad that many points are not touched upon in this article. Obviously, this is a very important phase of any job welding business not conducted on a strictly cash basis. Especially is it important in a business era such as we are passing through now.

How Railroads Use Welding Is Topic at Philadelphia Section Meeting

"Railroad Welding" will be the subject covered at the next meeting of the Philadelphia section of the American Welding Society to be held on November 21st at the Engineers Club. Papers will be presented on both oxy-acetylene and arc welding. About 150 attended the October meeting of the Philadelphia Section. E. A. Burt, chief engineer, The Heine Boiler Co.; Wm. D. Halsey, assistant chief engineer, Boiler Division, The Hartford Steam Boiler Inspection and Insurance Co., and T. M. Jackson, electrical engineer, Sun Shipbuilding & Dry Dock Co. were the speakers.

Negligence in Wearing Goggles Bars Recovery of Damages for Injury

By Leslie Childs

It is elementary law that an employer is bound to furnish his employees a reasonably safe place in which to work, and reasonably safe tools and appliances with which to perform the task assigned. But, having done this, there is a corresponding duty upon the employee to use reasonable care for his own safety, both as to his surroundings and in the use of the tools and equipment furnished him.

By the same token, the failure of an employee to use reasonable care in cases of this kind may bar his recovery of damages for injury resulting from his own negligence. The application of this rule is illustrated in a striking manner in a recent case, involving injury to a boiler maker caused by his neglect in not wearing a proper safety appliance. Though the employee in this case was not engaged in welding, the details will be of interest to the welding industry because of a similarity to some damage cases involving welding.

Here the plaintiff was a boiler maker in the employ of the defendents, and in the regular course of his employment entered the heated fire box of an engine for the purpose of calking stay bolts by the use of an air hammer. The defendants provided the plaintiff with goggles which, under the shop rules of the defendants, the plaintiff was required to wear when using an air hammer on steel.

When the plaintiff had finished the job, his goggles were steamed up, and he pushed them up on his forehead while inspecting the work. He then discovered one bolt that was not quite drawn up and which required an additional stroke of the hammer.

In this situation, the plaintiff, without readjusting his goggles, brought the hammer into play and struck the bolt. A piece of steel flew off the bolt head, striking the plaintiff in the eye and causing a serious injury. The plaintiff thereafter brought action against the defendants for damages for the injury suffered.

The plaintiff based his action on the contention that the defendants had been negligent in not furnishing him proper goggles; that the kind of goggles furnished, being equipped with glass lenses, when used in a heated firebox allowed moisture to gather upon the lenses, which rendered them unusable; the argument being that only goggles equipped with fine screen lenses, or lenses of glass properly ventilated, were suitable for the work the plaintiff was doing.

In reply the defendants showed that they made every effort to supply their boiler makers with the most approved kind of goggles that the market afforded, and that it was the duty of the plaintiff to wipe the moisture off when the glass became clouded. In addition, the defendants pointed out that the plaintiff's injury resulted from not wearing the goggles when using the air hammer, rather than from any defect in the goggles.

On the above state of the record, the trial court held the defendants not liable for the plaintiff's injury, and in accordance with this finding rendered judgment for the defendants. From this judgment, the plaintiff appealed to the higher court, and here in reviewing the record and in affirming the judgment the court, in part, said:

"There is no question but that it is the duty of the master to furnish his servant with a reasonably safe place

in which to work and with reasonably safe tools and appliances with which to perform the duties imposed upon him. But the heated condition of the firebox added no element of danger to the work being performed, other than the generation of steam, causing moisture to collect on the lenses of the workmen's goggles, and this condition is shown only in connection with the alleged duty to furnish a type of goggles which would not readily yield to this condition. * * *

"The testimony on behalf of plaintiff is to the effect that the rules of the company required boiler makers to wear goggles while using the air hammer on steel, which rule was well known to plaintiff, and that for two years the company had furnished the men with goggles; that it had changed the type from time to time in an effort to secure the best type; that all known types would accumulate moisture under such conditions as those described in the complaint, and the wearers were frequently compelled to wipe the lenses off with their handkerchiefs.

"Plaintiff testified that he did not think there was any danger of splinters of steel flying from the particular bolt at that time, as the danger comes from striking a rough bolt head in the early stages of such an operation and, consequently, he applied the hammer, giving the bolt a single stroke. * * *

"It would have been a simple matter, in conformity with past custom and experience, to have wiped the moisture from the lenses and readjusted the goggles before reapplying pressure to the trigger of the hammer for the purpose of correcting the condition of the one bolt.

"Contrary to his expectation, a small particle of steel flew off of the bolt head and into his eye. Clearly, the proximate cause of the injury was shown to be, not the negligence of the defendants in furnishing plaintiff defective goggles, if they were defective, but plaintiff's failure to readjust his goggles before recommencing work with his air hammer, in disregard of the rules of his employer. * * * Judgment affirmed." (300 Pac. 210.)

The Repair Welder Should Consider Himself a Manufacturer

By Willis Parker

"Several years ago it was said that welding was in its infancy," declares W. F. Stoody, president of the Stoody Company, Whittier, Calif. "But we can truthfully say *today* that welding is in its infancy."

Mr. Stoody is an expert welder himself, and he and his brother, S. M. Stoody, operated a welding shop for many years, until the development of hard-surfacing rods and other welding equipment made it necessary for them to devote more time to the manufacturing end. His experiences as a partner in a welding company indicate that he was highly successful in getting business, and that he created business where there didn't seem to be any. Therefore his views of the future of the welding industry incorporate some excellent selling ideas.

"One handicap under which many welders are working is the idea that they are repairmen," Mr. Stoody explained. "When a piece of machinery wore out, they might be expected to be called to fix it; or to repair it if it broke. This is a mistake. They should consider themselves as manufacturers, inasmuch as they can, if they try, often present the customer with something better, after the welding is completed, than he had in the beginning.

"Hard facing has taken such strides in the past several years and so many excellent rods have been developed that there is an unusual opportunity awaiting any welder who goes after it.

"Too many welders base their prices on a percentage of the replacement cost of the article repaired. In many instances the price is set at one-half the cost of a replacement part. This is a mistake. The price should be based upon the amount of service the repaired article will render. If, for example, a welder builds up and hard faces a plow share which when completed will last twenty times as long as a new point, it is no highway robbery to charge the farmer $8.00 for the job even though a new point would cost him $4.50.

Keep Track of Costs

"Nor should prices be based entirely upon the hours required for the work and the cost of the materials used. The welder should keep track of the costs of several jobs of the same type, then compute a fair price, which then should be set for all subsequent jobs of the sort. I remember that when my brother and myself were operating a welding shop, we fixed a certain price for building up and hard surfacing one type of tool used in the oil industry. One day the superintendent raised a howl because we charged him the same price for building up a tool that was not so badly worn down as one previously sent in. We countered by the statement that he would have howled just as much if our prices varied and he should have sent the less-worn tool in before the worst. A fixed charge for one kind of work places the welder in the manufacturers' class and proves that he not only knows welding but knows his costs as well.

"I do not mean that the welder should shun the general run of repair work, including broken stove parts, split boilers, broken washing machines, and such like; but he should conduct this business in a manner analogous to a manufacturing concern which not only fabricates the original machine and its replacement parts, but also has a service department for repairing machines which have proved defective.

Develop New Business

"The welder's first interest should be the development of new business, which the advancement in hard facing permits. There is an abundance of material in his territory—farm machinery, road-building equipment, excavating tools, and, if he is in an oil region, drilling equipment. If he can prove to the owners and operators that he can rebuild that equipment by proper welding, he can get the business. It's lying around loose like stones on a hillside. He should study the conditions in which the equipment works and then evolve methods of building it up and surfacing it so that it will do better work than it did when it was new. He must develop a technique for each type of work and learn what metals are the best and most economical to use.

"The early history of the automobile business is a good example of the welder's opportunity. In early days one bought an automobile chassis, motor and wheels for a certain amount of money—the body, too. But then there were the accessories, often including the tires, which had to be bought separately, to make the machine function more agreeably. One had to buy bumpers, windshield, horn, spare tire, if not all the tires. Some dealers were wise enough to fully equip cars after they had received

them from the manufacturers, and offer them to the public at a stated sum, which was, of course, more than the price unequipped.

"And so it is with much of the machinery offered today. It is only partly efficient. The up-and-coming welder may add improvements which will make it function better and last longer. It will not be long before farmers will be so well educated to the value of hard facing on plow points that they will not put them into the ground until they have taken them to a welder to have a hard face put on. The same condition is noticeable in the oil fields. When drillers and operators became cognizant of the value of hard facing on drills, they insisted that their new drills be hard faced before they would put them into the ground. The welders who educated drillers to this state naturally have profited thereby.

Highway and Agricultural Equipment

"In every welder's territory or community, there is plenty of highway construction and maintenance equipment to be hard faced after being built up. There is plenty of farm machinery, too. And welding is merely in its infancy. It may take a little work to educate the users to the value of the better equipment, but, once you have educated a few, the others will see the light and your services and skill will be in great demand.

"When we started in the welding business, one of us would, about 9 o'clock in the morning, deliver the work we had finished; and while he was out, he would stop at farm houses in the region and solicit business, always bringing in something by mid-afternoon. We'd work late at night to finish it up, and the other would deliver it the next morning and solicit business. We followed this alternating sales method for many months, and thereby kept our shop busy all of the time."

Arc-Welded All-Steel Garage

The Hobart Brothers Co., of Troy, Ohio, are doing experimental work on the construction of a garage and 5-room home to be built entirely of steel. They have faced the problem of design for maximum strength with lightest weight.

This garage is on Hobart Road within half a square of their plant, and measures 18x20 ft. Overhead doors of the most approved type are used. The frame of the garage is entirely of steel, arc-welded together with one of the company's gas-engine-drive portable electric-arc welders.

The uprights are constructed of two light-weight angles, welded together to form a channel. These are spaced 2 ft. apart and welded top and bottom to a steel strip. A more economical construction would be by channels formed of light-weight steel.

After this frame work has been erected, set in place and securely welded into one piece, side walls of metal lath are securely tack welded to the frame, forming a very rigid construction.

A flat roof of steel is used in place of the conventional cone or hip roof type. Construction of the flat roof is rather unusual as it is made up of 16-gage Armco sheet steel, formed and bent, and arc welded together in such a way as to produce a cellular or box type construction which is very strong, and will stand an enormous weight. The size of the cells are 6 in. thick by 10 in. wide, which means that every 10 in. a piece of 6 in. steel stands on edge and gives thickness to the roof. This construction combines the framing or rafters of the roof with a top and bottom surface, representing the top of the roof and the ceiling of the garage.

The top of this roof section is rendered water-proof by the addition of roofing paper, and a coating of paint on the bottom furnishes a very pleasing ceiling, in contrast to the ordinary rafter and the back side of a shingle roof. This type of construction also lends itself to insulation. The 6 in. cellular space furnishes an air section which in itself is an insulator, but merely by the addition of mineral wood or powdered gypsum into these cellular types a completely insulated roof is assured.

The edges of the flat roof are turned up on all four sides and a down spout arranged at the rear leading from one corner of the roof. This eliminates cost of gutters.

Erecting an All-Welded Steel Garage.

Stucco is applied to the metal lath on the complete exterior. Metal lath can be tack welded to the interior and plastered. A very attractive ornamental rail extends around the entire roof, and the windows of the garage are of steel, arc welded in place to the frame work. In all, it gives a very pleasing architectural effect. The structure, of course, is entirely fire-proof.

If, by means of production methods and good design, low cost can be added to its advantages, the steel building is here to stay. It lends itself to fabrication in the factories to be transported to the place of location and erected there by means of arc welders. This factory control should assure lower costs because it is easier to get production in the factory than on the job. Weather conditions do not interfere, and a plant is better equipped to handle the work because of machinery and methods not available in the field. Hobart Brothers have found from this experiment that a building could be ordered and in less than a week's time it could be finished, erected and ready for use.

The unusual interest shown at the present time in steel buildings by trade magazines, architectural papers, and the steel companies themselves shows that we may have developed, before we know it, a new industry which will be the means of leading us to new heights of prosperity.

Engineers Will Serve as Advisers on R. F. C. Loans

The active aid of the engineering profession in expediting loans for self-liquidating construction projects is urged by William S. Lee, president of the American Engineering Council, in a letter to thirty-seven engineers who have been invited by the Reconstruction Finance Corporation to serve in advisory capacities in connection with applications for loans of this character.

These engineers will be members of the advisory committees of the Corporation's loan agencies, and will sit with those committees when self-liquidating loans are being considered. Encouragement of loans for small projects is stressed by Mr. Lee, who points out that many engineers in the various R. F. C. loan areas have volunteered to assist the engineer members of the advisory committees. These engineers will:

1. Inform the public as to the provisions of the Relief Act relating to self-liquidating projects; and as to the decisions made by the Corporation as to the character of projects it could finance, and related subjects.

2. Discourage applications being made for loans on projects which do not come under the Act, or on projects which are unsound either from an engineering or financial point of view.

3. Render every possible advice to those who contemplate making applications on worthy projects so that their applications will be in due form and will contain the necessary engineering and financial information.

4. Encourage governmental officials to make applications for loans for worthy projects. It would be most helpful if the Corporation received a large number of applications for loans for small projects.

Company for Negotiating Market Rights Opens Office in New York

Offices have been opened in New York City by Amerika-Interessen, Inc., organized as the American unit of A. G. Fuer Amerika-Interessen, operating also in Berlin, Paris and London. This company has announced its purpose as being that of making available to the manufacturers of one country devices, processes and patents that have proved successful in other countries. The company is prepared to negotiate for licenses on a royalty basis or for the outright sale of manufacturing and marketing rights.

Omaha Schools Issue Outline on Metallography for Welders

A 48-page booklet entitled "Course Outline in Metallography for Welders", designated as Bulletin No. 1, has been issued by the Department of Vocational Education of the Public Schools of Omaha, Neb., under the direction of W. C. Cumming, instructor, and J. R. Hawke, Director of Vocational Education. Metallography is generally omitted from courses on welding because of the knowledge required of physical sciences on the part of the student who desires to make a study of the subject. This subject, however, is now receiving more attention than formerly because of a growing recognition of its importance to the welder.

Licensed to Manufacture Stainless Clad Steel

Following the recent announcement of the Ingersoll Steel & Disc Company, Chicago, a division of the Borg-Warner Corporation, that they had perfected and patented a commercially successful stainless clad steel, comes the more recent news of the consummation of a license agreement with the Allegheny Steel Company of Brackenridge, Pa., by which the latter will manufacture stainless clad sheets exclusively under the patents of the Ingersoll company. The joint participation of both companies in the marketing of the perfected product tends to assure its eventual widespread use in the many applications where a low-cost corrosion resistant metal is desirable. The process of making welds in this type of clad metal was described in the October issue of THE WELDING ENGINEER.

Alexander Milburn Company Announces New Paint Gun

A paint spray gun with several novel constructional features has been put on the market by the Alexander Milburn Company, Baltimore, Md. The body is of a high-tensile-strength aluminum alloy. The passages for air or fluid are all straight drillings with no by-passes, and the design of the air atomizer head is said to give great rigidity and close alignment. Means are provided for controlling the initial air pressure from its source without an air regulator. The gun is available in a large and a small type, weighing 1¼ and ½ lb. respectively.

Metallizing Association Organized

Coming from all parts of the world to witness the "Metallizing" process of metal spraying, over fifty engineers from different divisions of the metal industries gathered in Los Angeles, Calif., in September. At the close of the demonstrations they organized the International Metallizing Association, electing as president L. E. Kunkler, of Los Angeles, who is also president of the Metallizing Company of America.

"We have been developing the 'Metallizing' process in our California laboratories for twelve years," explained Mr. Kunkler, "and because the process affects every phase of industry, worldwide interest was created when we officially announced the process as commercially practicable. Leading industrial firms have sent their engineers here to study 'Metallizing' and its applications at first hand, and we have been conducting an international school. Now these engineers are returning to their countries to introduce 'Metallizing' to their fellow countrymen and workers. The Association has been organized to continue the educational work begun here."

The headquarters of the Association will be at 1218 Long Beach Ave., Los Angeles, Calif. Charles Boyden has been commissioned by the Association to continue the research work, developing new uses for the process, and R. S. Jensen has been made secretary. The facilities of the organization are available to any person or firm interested in the uses of "Metallizing," and membership is open to individuals or firms who enter actively into the "Metallizing" field.

American Brass Company to Exhibit at National Power Show

An operating demonstration of arc welding Everdur metal will feature the exhibit of The American Brass Company in space No. 65 at the National Exposition of Power and Mechanical Engineering, to be held at the Grand Central Palace, New York City, December 5th to 10th. The background of the set displays will comprise a general selection of Anaconda copper and brass products, including condenser tubes. This will be the first public showing of Beryllium Copper in the form of sheets, rods, tubes and wire; this alloy is said to have high strength, high conductivity, and special heat-treatable qualities.

Lincoln Equipment Used On Western Jobs

A 14,000-gallon oil storage tank recently welded in Portland, Ore., and an all-welded 45-in. pipe line for the Los Angeles Department of Water and Power were welded with "Fleetweld" rods and with welding equipment manufactured by The Lincoln Electric Company of Cleveland, Ohio. This information supplements that given on both of these jobs in the October issue of *The Welding Engineer*.

Exhibit of Welding Pipe Fittings

The Bonney Forge & Tool Works will display Weldolets and Thredolets at booths No. 487 and 488 at the National Power Show to be held at the Grand Central Palace, New York City, December 5th to 10th. Several interesting applications showing the adaptability and the method of installation of these welding fittings will be shown. Fred Durham, vice-president, and G. Fred Sherman, sales manager, will be in attendance.

Death of J. S. Button

J. Scott Button, head of the architectural engineering service bureau of the General Electric Company, died at Schenectady, N. Y., November 3rd of pneumonia. He entered the employ of the company in 1896. He was active in the work of architectural and electrical organizations and was a member of the welding committee of the American Institute of Steel Construction.

New Trailer-Type Arc Welder

A 300-ampere arc welder driven by a V-8 engine, with the entire unit mounted on a pneumatic-tired trailer, is a new development of the Universal Power Corporation, 12367 Euclid Ave., Cleveland, Ohio. One of the outstanding features of this welder is the design of the generator, which employs the "shunt inductor" principle for arc stabilization, similar to that used in the motor-generator sets manufactured by this company. The "shunt-inductor" principle is said to result in unusually high efficiency, increased metal deposit, and to render control of the arc so easy as to make the work less fatiguing to the operator.

The novel mounting of the horizontal radiator directly over the engine, with a blower-type fan, aids materially in keeping the unit cool. A sliding cover over the radiator allows radiation and cooling to be easily controlled to suit temperature conditions.

The features of flexibility and stability, together with the high-speed-trailer

Welder Mounted on Pneumatic-Tired Trailer

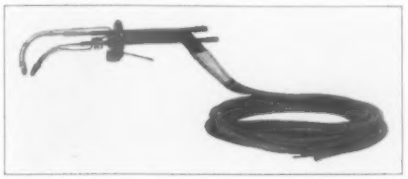
mounting make this unit particularly adapted for structural steel erection, pipe-line extension, and general maintenance and repair in the large plant or field.

New Electrode Holder for Atomic-Hydrogen Welding

A new type of electrode holder has been developed by the General Electric Company for atomic-hydrogen arc welding with flexible tungsten electrodes. These flexible electrodes are carried in curved tubes, forming a part of the holder, and are brought into position by means of a screw feed ejector. This new electrode holder is said to facilitate welding in confined places, and to decrease operating costs by reducing breakage of electrodes.

The tungsten electrode, made up of several small-diameter tungsten wires stranded together, is so flexible that the ends of a 12-in. length can be brought together without giving the electrode a definite set. The consumption of this electrode is the same as that of the rod-type electrode.

The electrode is more easily adjusted than with the rod-type holder, and can be consumed to a length of approximately 1½ in., at which point the electrode will drop out of the nozzle tip. Before this occurs, a new electrode is mechanically inserted into the ejector, and a few turns of the screw feed places



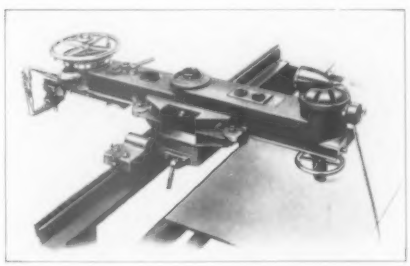
New Holder with Flexible Tungsten Electrodes

the electrode in the welding position. The hydrogen tubes of this new holder are easily detached from the handle, and the purchaser can make any necessary replacements at his own plant. Likewise, all other wearing parts have been arranged for quick and easy replacement.

Another feature of the new holder is its adjustment for controlling the position of the fan-shaped welding flame. The flame may be controlled to be either parallel to, or at right angles with, the axis of the handle by a slight turn of a thumb screw.

Oxygen-Jet Cutting Machine With Steering-Wheel Control

A gas-cutting machine in which the travel of the torch can be controlled from the torch end of the transverse carriage by means of a steering-wheel arrangement, has been developed by Messrs. Messer & Cie, Frankfort-am-Main, Germany. The shape to be cut can be laid out on the plate or sheet which is held in position under the torch. The operator can then watch the movement of the torch as it follows the outlines of the desired shape, and guide it



The Steering-Wheel Arrangement Guides The Torch

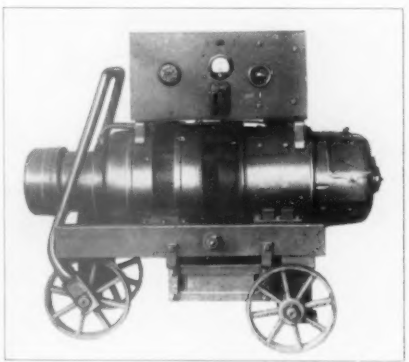
by means of the conveniently located handwheel, which resembles in appearance an automobile steering wheel.

This machine has a lower or longitudinal carriage and an upper or transverse carriage. At one end of the transverse carriage is located the propelling mechanism and at the other end the torch. The driving motor operates a roller which bears upon the upper face of a steel plate carried on the machine base. The movement of the roller is transmitted to the cutter by the cross carriage, thus controlling both direction and speed. In turn, the direction of travel of the roller, and therefore of the cutter, is determined by the setting of the handwheel mounted over the torch. This handwheel has a graduated scale indicating the direction in which the cutter is moving, and is connected to the steering mechanism at the other end of the carriage. This machine is also provided with the necessary equipment for template cutting.

Imperial Electric Company Announces New Arc Welder

In the "Imperial Arc," their latest development in arc welders, the Imperial Electric Company, of Akron, Ohio, announces the development of a machine that is said to lessen the difficulties encountered in welding many ferrous and non-ferrous metals and alloys. With the "Imperial Arc," it is claimed that it is easy to strike the arc and hold it in difficult places and on work ordinarily requiring great skill, such as on 18-8 stainless steel, chrome-nickel, and other alloys.

Outstanding features of this new welder are dual control for close regulation of the welding heat, separate excitation for quick recovery, reverse



New "Imperial" Arc Welder

polarity switch for convenience in changing leads, and a "cushioned energy" mounting. This is said to be the first arc welder in which a rubber mounting is used to suspend the weight of the motor-generator set in the frame. This mounting is not the ordinary rubber cushion, but is "rubber in shear," which is claimed to eliminate entirely any vibration from the revolving parts as well as absorb all starting torque and other shocks.

The control box is of the dead-front type and is mounted on the top of the unit. It contains "start" and "stop" control buttons, current range switch, voltage control, reverse-polarity switch, and combination center reading voltmeter and ammeter. The reverse-polarity switch is a small toggle switch which permits welding either straight or reverse polarity and renders it unnecessary for the operator to interchange leads.

This welder has the required voltage capacity to maintain the long arc used with the new speed rods. The special design of reactance coil is said to elimi-

nate high and low points in current flow.

The "Imperial Arc" welder is available in all conventional types, including motor drive, gas-engine drive, belt drive, and track welder arrangements, in sizes from 100 to 800 amperes. Larger sizes and special welders are available for every purpose. In the large sizes, this welder is particularly adapted to the welding of heavy plates and for heavy railroad-shop welding.

For some years the Imperial Electric Company have been making their own arc welders for use in their shop, making use of the data and experience collected in 40 years of motor and generator manufacture. This new welder is the outgrowth of this development, and marks the entrance of the company into the welder field.

The Bryant Machinery & Engineering Company, 400 W. Madison St., Chicago, Ill., are exclusive national distributors of the Imperial welder, and have organized a track welding service, using the Imperial welder, which includes engineering and a full equipment of grinders, cable, set-off equipment, and complete line of accessories.

Metal Spray Guns for Coating Surfaces With Metal

A metal spray gun for which low maintenance is claimed and having desirable features of control and high capacity, has been announced by the Metal Spray Company, 113 Llewellyn St., Los Angeles, Calif. This gun consists of a wire-feeding mechanism and a gas-mixing chamber and combustion chamber, or nozzle. The wire-feeding

Spraying Metal on Revolving Machine Part. View of Gun at Top

mechanism includes a power turbine, reduction gears, and knurled wire-feeding wheels.

In this gun, the turbine and reduction gears are enclosed in an aluminum case, while the wire-feeding wheels, gas-mixing chamber and nozzle are made separate units, yet thoroughly synchronized in operation. This design is said to eliminate any excessive wear of the worm gears caused by wire metal particles and to prevent the collection of combustible gases in the gear case. Independent valve controls are provided for oxygen, acetylene, and air, as with a welding torch.

This gun will take metal wires of from 12 gage to 3/16 in. diameter, and results in a higher rate of deposit than where smaller wires must be used.

Whelite Announces Bronze Rods for Gas Welding

A line of bronze rods for gas welding cast iron and other base metals has been put on the market by Whelite Distributors, 1737 East 7th St., Los Angeles, Calif. These rods, it is claimed, can be used without fluxes or coatings, thereby doing away with gases and smoke and enabling the operator to do fast work by eliminating the broken heat and the time out to visit the flux box. This bronze is said to flow very freely and to make strong, corrosion-resisting welds. These rods come in 1/8 and 5/32 in. sizes, 36 in. long, and are packed in 10-lb. bundles.

New Blakeslee Degreasing Machines

A new line of machines which remove dirt and grease from work, rendering a chemically clean surface, ready for welding, plating, painting, lacquering or other finishes, has been put on the market by G. S. Blakeslee & Co., 1844 S. 52nd Ave., Chicago, Ill.

The new Blakeslee degreasers employ a chlorinated solvent which when heated to the boiling point vaporizes and is condensed back into another compartment of the machine in its pure form, then overflows back into the original tank. Thus all the solvent is saved and is used over and over again. The solution, known as "Blacosolv", is said to dissolve grease, oils, fats, etc., a great deal quicker than does naphtha, gasoline and solvents of that type, and it requires only about one-tenth the amount of heat to heat the solution as does water.

Blacosolv is said to be non-inflammable and cannot explode; neither does it support combustion. It cleans most rapidly, and the work is dry the instant it is removed from the degreasing machine, so no subsequent operations, such as wiping, blowing or drying, are necessary. It is a heavy, colorless, mobile liquid with no disagreeable odor, boiling below the boiling point of water. It is not decomposed by water in any amount at ordinary or moderately elevated temperatures. In fact, it is claimed that a layer of water on it tends to protect and prevent oxidation. It has no effect or corrosive action on the common construction metals even when water is present. So rapid and positive is it in its cleaning power that iron, brass and readily oxidizing metals will rust or oxidize in a few minutes after leaving the degreaser if the next operation is not performed on them immediately. However, highly finished thin brass and other easily oxidized parts can be handled through the degreaser in such a manner so they will not tarnish or rust when put in storage or while waiting for other operations.

Machines are available in both hand and automatic dip models. Spiral types are furnished for hollow and cup-shaped pieces. The illustration shows a hand-dip model T degreaser which is available in five sizes. It requires but small

Machine for Removing Dirt and Grease from Metal Parts

floor space and is especially adaptable for use at different points in the plant for quick degreasing of metal parts between operations. This model is equipped with strainers in the wash tank to remove chips, dirt, etc.

Jena Welding Glass

Welding glass designed for complete eye protection has recently been put on the market by the Jena Glass Works of Schott and Gen., large manufacturers of optical, technical and scientific glassware. This glass is guaranteed to meet the U. S. government specifications, and every piece bears the indelible mark "J" and the proper shade number. The Fish-Schurman Corporation, 230 E. 45th St., New York, N. Y., are exclusive agents of the Jena Glass Works in this country.

Harnischfeger Issues Booklet Entitled "Weld It Well"

An illustrated booklet carrying the above title and devoted to modern welding practice and design of the P. & H. Hansen electric arc welder, has been published by the Harnischfeger Corporation, 4513 National Ave., Milwaukee, Wis. A large sectional view of this welder in colors points out the features of construction. Of further interest are an oscillograph record of arc stability and arc recovery, radiographs of welds, and illustrations of products fabricated by arc welding. The booklet also includes tables of specifications on P. & H. Hansen welders, electrode sizes and currents, mechanical properties of steel with varying percentages of carbon, and properties of minerals and alloys.

Repair-welded with TOBIN BRONZE at a cost of $23.66 . . . *less than* 5% *of estimated replacement cost*

Finished Tobin Bronze weld in the shell of the conical ball mill.

There is a suitable Anaconda Filler Rod for every bronze-welding purpose. Principal Anaconda Welding Rods, with their melting points, are listed below:

for oxy-acetylene welding

Tobin Bronze*	1625° F
Manganese Bronze	1598° F
Brazing Metal	1634° F
Electrolytic Copper	1981° F
Silicon Copper	1981° F
Phosphor Bronze	1922° F
Everdur*	1866° F

for arc welding

Silicon Copper	1981° F
Phosphor Bronze	1922° F
Everdur*	1866° F

*Reg. U. S. Pat. Off.

THE OUTSIDE SHELL of this conical ball mill was badly fractured in two places. A new casting was quoted at $485 f. o. b. factory, to which figure would have been added freight charges and the cost of installation. An experienced welder recommended bronze welding as the most practical way of restoring the mill to service.

Preparation was completed by two men in three hours. Actual welding was accomplished by two men in seven hours. The finished weld required 15 lbs. of Tobin Bronze Welding Rods, one pound of flux and 175 cu. ft. each of oxygen and acetylene. The cost of the 7-foot weld was $23.66 . . . less than 5% the cost of a new casting.

The unvarying high quality of Anaconda Copper Alloy Rods is due to the technical experience gained in developing a complete line for low temperature welding—gas and electric. Anaconda Rods are available through leading distributors . . . usually shipped in bulk, but also obtainable in clearly labeled ten-pound packages. For complete information, ask for Publication B-13.

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ANACONDA WELDING RODS

Booklet on New Bronze Welding Rod

A 20-page booklet recently published by The Linde Air Products Company, of New York, N. Y., describes the physical and welding characteristics of the Oxweld No. 25 M. bronze welding rod. Tensile strengths of between 56,000 and 60,000 lb. per sq. in. and ductility in excess of 30% are claimed for this new rod. Decreased fuming and excellent weldability are other characteristics claimed. Many important applications are described in joining metals and building up wearing surfaces. Of special note are recommendations on a new technique for bronze welding and for the fusion welding of brasses and bronzes. The proper frame adjustments are described for the various base metals.

Design of Welded Levers

Application Sheet No. 31, Series 2, issued by The Lincoln Electric Company, Cleveland, Ohio, is devoted to elements of design of levers. Descriptions are given of the welded parts forming a large butterfly valve built for installation in the piping arrangement of gas-making machinery. Details of design are discussed.

Pipe Fittings For Welding

The advantages of using Taylor tees and elbows in welded pipe lines are told vividly by means of pictures in the October issue of "Taylor Forge," published by the Taylor Forge & Pipe Works, P. O. Box 485, Chicago, Ill. Particular emphasis is laid on the ability of a welded line with elbow to withstand deflections due to expansion and contraction, and on the neatness of jobs employing seamless tees.

Murex Issues Syllabus on Training Courses in Arc Welding

A syllabus relating to training courses in the electric arc welding school conducted by the Murex Welding Processes, Ltd., Ferry Lane Works, Forest Road, London, E. 17, England, has been prepared for distribution. This company offers three separate courses of instruction suited to the welding operator, the technical foreman or supervisor, and the designer. The supervisors' and the designers' courses are largely theoretical and are intended to be preceded by the operators' course. These courses are intensive in character and are intended to cover their separate fields in the minimum of time.

New Roebling Catalogue

"Wire Rope Slings" is the title of a new 85-page catalogue issued by John A. Roebling's Sons Co., Trenton, N. J. Engineering data on wire rope slings are given, and many applications are illustrated.

News in Brief

The Stulz-Sickles Company, of Newark, N. J., have appointed the Machinery & Welder Corporation, 316 N. Sheldon St., Chicago, Ill., and the Union Hardware & Metal Company, Los Angeles, Calif., as distributors of their Manganal manganese steel electrodes.

Fred C. Archer, formerly president of The Fred C. Archer Company, has been appointed manager of the Philadelphia district of The Lincoln Electric Company.

M. W. Hippe has opened the Hawkeye Welding Service at 500 North Central Ave., Burlington, Iowa. This shop is equipped to do complete portable arc and acetylene welding on jobs. Mr. Hippe was for 15 years connected with various industries and for eight years served as an instructor with the Union Carbide and Carbon Corporation and on railroads and as a service engineer with the Linde Air Products Co.

H. B. Rice, of the Metal Spray Company, Los Angeles, Calif., recently returned from a business trip to Seattle, Wash., where he supervised the installation of a branch office of the De Laval Pacific Company, of San Francisco, exclusive Pacific Coast distributors for the products of the Metal Spray Company.

William J. De Loach and C. G. Pipes, of Los Angeles, Calif., are partners in a new job welding shop which they recently opened for business at 497 San Fernando Road. General repair welding of all kinds by both acetylene and electric processes will be featured in the new shop. Mr. De Loach has in the past specialized in the manufacture of all-welded asphalt kettles used in street and highway construction work, and expects to continue this work as a feature of the new shop's activities.

R. X. Cooke, oil operator in the East Texas oil field is employing several welders in the construction of a refinery in the city of Gladewater, Texas. The welding in connection with this work will be by both electric and acetylene processes. The capacity of the plant will be 1,000 barrels daily.

S. C. Eastman, of the Metallizing Company of America, Los Angeles, Calif., presented a paper at the October 4th meeting of the Mid-Continent section of the American Society of Mechanical Engineers at Tulsa, Okla. The title of Mr. Eastman's paper was "Prevention of Corrosion and Erosion by Coating of Metal on Metal."

M. L. Beck, of San Diego, Calif., is opening a welding department in the plant of the Combined Machine Corporation, which recently opened for business at 14th and "F" Streets. General welding of all kinds with special attention to automotive and marine work will be featured in the new shop. Mr. Beck is well known in San Diego welding circles, having recently been associated with the Peters Welding Works, and prior to that he was with the San Diego Welding Works.

Frank L. Gibbons, until recently associated with the Republic Steel Corporation, manufacturers of electrically welded steel pipe and tubular products, is now connected with the Timken Steel & Tube Company as director of steel sales. Subsequently, Mr. Gibbons was engaged in sales work for the Central Alloys Company, which a few years ago merged with the Republic Steel Corporation.

The Fly Wheel Welding Shop, at 7th & E Sts., Tacoma, Wash., have found that it pays to specialize in the welding of flywheels on automobiles, and due to their efficient mechanics and type of work turned out, have built up a profitable business.

Otto Grunwalt has completed a modern iron working and welding plant at Stuart, Iowa, confining his work mostly to farm needs and demands.

Lexwell S. Low, formerly superintendent of the Permutit Company's Brooklyn plant, has joined the welding sales division of David H. Smith & Sons, Inc., of Brooklyn, N. Y. Mr. Low has been assigned to the Long Island territory with headquarters at Mineola, L. I., N. Y.

A new welding and machine shop was recently opened at 1505 East Garvey Ave., Walnut Acres, Cal., under the management of E. W. Shock.

Lectures on technique of structural design and on welded fabrication as they pertain to aircraft construction were the features of a meeting of the Australia Welding Institute, held in Melbourne, Australia, on the evening of October 25th.

The Los Angeles District office of the Lincoln Electric Company report the recent sale and delivery of a new 300-amp Lincoln electric welder to M. P. Mogensen, of Garey, Calif. This is the first installation of electric welding equipment by Mr. Mogensen, who operates a job welding and blacksmith shop in Garey.

The Mendel Iron Works, 712 Date St., Los Angeles, Calif., recently opened for business, featuring job welding of all kinds in addition to their specialty of ornamental iron work. Albert Mendel, who is manager of the plant, formerly operated a shop at 1312 Echo Park. The new location was formerly occupied by the United Tank & Welding Works.

C. R. Owens, of the San Francisco branch of the General Electric Co., gave an address October 6th on "Arc Welding" before a meeting of the newly formed Kettleman Hills chapter of the California Natural Gasoline Association. The meeting was held at the Fox Hotel in Coalinga, Calif.

Classified Ads

Help Wanted—75c per line, minimum 4 lines.
Jobs Wanted—4 lines free.
Other Ads—$1.00 per line, minimum 4 lines.
Count 8 words to line. Add 6 words for keyed address.

FOR SALE

For Sale—Bargains—Arc Welders, gasoline or electric drive. 30 days trial. Terms if desired. Write Ken's Equipment Exchange, Box U 821, Troy, Ohio.

WANTED TO BUY

Arc Welder—One 300-amp. belt-driven electric welding generator. Prefer Hansen or Lincoln. State price, condition, and age. The Flour City Oxwelding Company, 2937 Third Ave., S., Minneapolis, Minn.

AGENTS WANTED

Distributors and Agents—For new low-cost electric speed rod, throughout the U. S. and foreign countries. Exclusive sales rights given. W. Drewes, 367 Fifth St., San Francisco, Calif.

POSITIONS WANTED

Combination Welder—Experienced in auto factory and aircraft welding. C. Swanson, 239 Marshall St., Pontiac, Mich.

Combination Welder—21 years' experience in all lines of work. Willing to go anywhere. References. Address Box 493, The Welding Engineer.

Combination Welder—Four years' maintenance and construction in gas plant and shop experience in large automobile plant. R. P. Jetty, 7551 Saginaw St., Chicago, Ill.

Combination Welder—Ten years' experience in all kinds of work, large and small. Married; 27 years old. Will go anywhere. J. F. Gipson, 323 Garland St., Swissvalle P. O., Edgewood, Pa.

Combination Welder—Five years' experience in electric welding on heavy plate and tank work, 2 years' pipe line and high-pressure steam line, and about 3 years' gas welding. E. R. Lasher, 116 Elm St., Warren, Pa.

Designer—Fifteen years in structural-steel and ornamental-iron works, designing for welded and riveted construction. Desires position with manufacturer of welded products or of welding equipment. Address Box 494, The Welding Engineer.

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Duraweld Goggles fit snugly to eliminate any chance of flying particles or stray light getting in They're easy on the face. Generous, light proof louvers provide ample ventilation.

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This worn asphalt mixer arm was built up with Stoody Self-hardening Alloy Steel Rods and faced with Stoodite. The cost of building up and facing was no more than the cost of a new arm. The salvaged arm will outwear several new ones and will save the labor of removing worn arms and installing new ones.

Mixer paddles are also hard-faced with Stoodite, Borium or Borod at a great saving in equipment and time.

Shovel teeth, scarifier teeth, grader and Fresno blades, and all other types of earth moving equipment faced with Tube Borium or Borod will save the operators substantial sums on the investment.

Ask your dealer for a demonstration, or further particulars about salvaging and protecting your expensive equipment.

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